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Registration.

WE have devoted a good deal of space in this issue to a contribution from Mr. F. W. Purse written in reply to the article on "Shoddy Wiring," which appeared in our issues of January 20th and 27th and February 3rd from the pen of Mr. H. R. Taunton. We have also taken advantage of the opportunity that presented itself of obtaining from Mr. Taunton any comments that he thought it necessary to offer in closing the discussion.

In publishing these two contributions we may disclose the fact that it was because a recent number of the official journal of the Electrical Contractors' Association contained so many articles on the subject of unsatisfactory work, the inefficiency of the Register and cognate matters that we invited Mr. Taunton to write his very interesting articles. But it was for other reasons also, amongst them being the knowledge that we possessed of unsatisfactory working of the Register in some places and the non-existence of it altogether in others.

The ELECTRICAL REVIEW, recognising that feeling in the trade regarding the Register is far from satisfied, and knowing that discussion of its merits or demerits must take place from time to time if the Register is to become powerful enough to be a force for general good, has placed its pages at the disposal of every party interested. It would be wrong for us to say such things as would bolster up the Register by pretending that all is well, just as it would be wrong for us to assert that all is wrong with it because its weaknesses are occasionally expressed in our presence.

In one very important matter at least Messrs. Purse and Taunton are in agreement, namely, in their regret at the lack of advertisement and publicity that the Register receives and the weakness that must inevitably characterise it because it is unknown to the public who place installation orders, and even to the lesser known contractors. We are inclined to agree with Mr. Taunton that the Register is vital to the contracting trade if it is to anybody, and the contractors' connec-

tion with it, and responsibility for it, cannot in fairness be belittled. We also agree with him that, so far as the great mass of the people are concerned, they are at present indifferent whether their prospective contractor is or is not on the Register, but they do want to know whether he is qualified to carry out their own job efficiently. Sometimes when local authorities have been appealed to regarding a set of estimates received, the applicant has been informed that "we have no registered contractors in this district, but so-and-so does a very good job," or there is such-and-such a firm over the border. We should like to have evidence produced to show that the Register is growing in membership, influence, and reputation at as rapid a rate as electrification work itself is increasing in volume. The most certain thing of all is that unless Registration is "put over" to the public in some enterprising form or other it will not fill the general place that it was intended to fill in connection with electricity supply progress.

We hope that the opportunity for Registration to be "talked, shouted, preached" about, as Mr. Purse says in his closing sentences, has been afforded by these useful articles in the Review, but after we have done our part in this way among the Trade, the necessity still remains for Registration to be popularised and understood among the public.

By-laws for Electrical Installations.

Whilst the Electricity Acts have conferred on authorised undertakers no powers of control over the materials and workmanship employed in carrying out electrical installations within their areas, so that local wiring rules have no legal force, there are certain exceptional cases in which the local authorities have obtained the power to make by-laws by inserting a clause to that effect in private Bills. Such by-laws when made have to be submitted to and confirmed by the Electricity Commissioners before they can be put in operation, and when so confirmed they are legally binding.

It appears that a number of Bills that are being brought before Parliament this year by local authorities contain this enabling clause, and it has been suggested to members of the I.M.E.A. that in view of this tendency it is very desirable that a standard code of by-laws should be adopted. West Ham Corporation obtained the powers some years ago, and adopted the I.E.E. Wiring Regulations, so far as they applied to the conditions, and since then the West Ham by-laws have been adopted by other local authorities which possess similar powers. Obviously it is in the public interest that uniform conditions should obtain throughout the country—consulting engineers and contractors who remember the chaotic state of the wiring "regulations" set up by scores of different electricity supply undertakers and insurance companies five-and-twenty years ago will cordially agree—and whilst we do not suggest that the I.E.E. code should be adopted, it might well be used as a basis upon which a short and lucid set of by-laws embodying the minimum requirements for safety to person and property could be drawn up. As the making of by-laws is restricted to local authorities, it seems that the I.M.E.A. might with advantage appoint a Committee to draft a model set for this purpose.

The Telegraph Service Report.

The report of the Committee on the Inland Telegraph Service, which was issued last week and is summarised elsewhere in this issue, deserves the most serious consideration on the part of the Government, the Telegraph Department, and the general public. For the first time, perhaps, the affairs of the Department have been critically scrutinised by hard-headed men in the front rank of the business world, from a perfectly impartial point of view, and their opinions have been set forth with freedom and decision; whether they have indicated the best solutions to the complicated problems that they have encountered remains to be seen, but at least they have shed a flood of light on the present position of the telegraph service and have brought the matter out of its normal obscurity into extreme prominence.

It is fully recognised that the telegraph occupies an intermediate position between the postal service and the telephone, and that the competition of its younger rival is growing more and more acute; unfortunately the telegraph system is by far the most costly, though less speedy than the telephone and less elastic than the post. Numerous suggestions are put forward by the Committee for the improvement and cheapening of the service, including the adoption of more efficient methods of working and the use of up-to-date apparatus, as well as the removal of irritating restrictions typical of a State department as contrasted with a private undertaking. It is noteworthy that emphasis is laid on the absence of incentive to progress, due to the system of promotion of the staff by seniority alone and to the sense of security instilled by Civil-Service conditions.

Special interest attaches to the new tariff proposed by the Committee, but misnamed a "flat rate"; it is, in fact, a double-tariff system with a fixed charge of 13d. per telegram plus a running charge of ½d. per word, recognising principles with which electrical readers are familiar; a rebate for telegrams during "off-peak" hours is also suggested. Both these methods have already been adopted by the telephone service.

The publication of the Report was followed by a bitter attack upon it by the Controller of Telegraphs in a public speech—an action which, though very human, was contrary to official etiquette and will probably attract the attention of the higher authorities. The Committee was appointed by the Postmaster-General himself.

Publicity for Electricity.

It is an old complaint that scientific and technical matters receive scant attention in the columns of the daily papers, unless they can be embodied in somewhat sensational form—in that event, phenomena and processes which have long been familiar to the technologist are often suddenly sprung upon the public as "new" discoveries. The directors of those papers are not really to blame for these characteristics; it is their function to feed their readers with news, and consequently such matters as we have in mind must be submitted to them in the guise of news, if they are to receive consideration. In many cases the substance is indeed real news, but the form is unsuitable; the information must be conveyed in simple language, free from technicalities, and must be "served up hot."

In recent years public interest in electrical matters has been deeply stirred, and electrical men should see to it that the fire is supplied with abundance of fuel, to keep it alive and promote its growth. One way of attaining this end is to supply the newspapers with brief but well-conceived articles and paragraphs, of which the "news value" is maintained at as high a pitch as possible. They should be forwarded to their destinations *immediately* on becoming available and should be in a form suitable for editorial use with the minimum of sub-editing. For example, when a paper is read before a local Centre of the Institution of Electrical Engineers—or any other electrical society, for that matter—the secretary should prepare a short *précis* of the paper, bringing out prominently only two or three of its leading features, and furnish it to the local papers in time for them to publish it on the following morning. In many cases such items would be promptly accepted and inserted—and all the more readily if a differently worded *précis* were sent to each journal, with a statement that it was not duplicated.

Without exaggerating the importance of free publicity of this kind, we may point out that electricity is destined to become literally a household word to the community in general, and that to neglect so simple and effective a means of popularising the idea is a short-sighted and lazy policy for which it would be difficult to find a valid excuse.

Electrical Tin-dredging Equipment.

The English Electric Co., Ltd., has been associated with some of the earliest electrical tin-dredging installations, and the following notes relate to equipment supplied in that connection.

By H. W. KEFFORD, A.C.G.I., A.M.I.E.E.

TIN has always been prized on account of its special physical characteristics, but in recent years its price has increased enormously, due to the great demand for it in nearly every industry. This has led to considerable activity in the development of tin-mining methods in the Federated Malay States, from which the bulk of the world's supply is drawn, and side by side with examples of the most primitive working there are electrically driven plants of the most modern design.

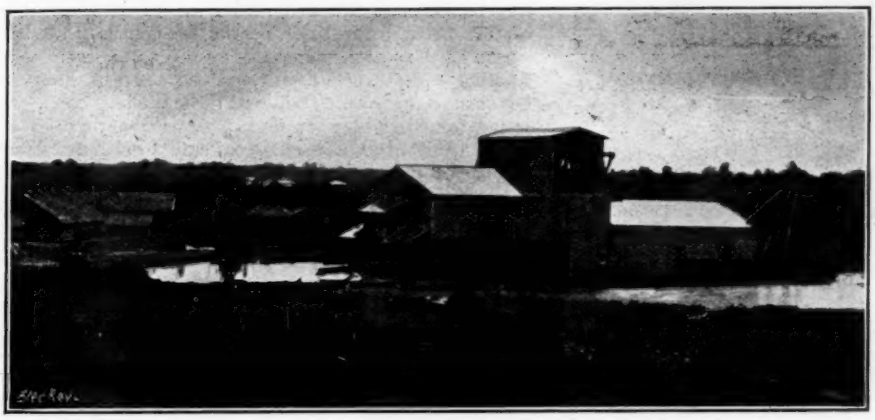


Fig. 1.—Typical Tin-mining Floating Bucket Dredger.

Tin ore is won principally in the form of the oxide mixed with lighter sands and alluvial wash, or as crystals and grains embedded in a rocky matrix, which has first to be crushed; the former is by far the more usual. The most general commercial method of separating the ore from the lighter material is by streaming the whole with water in a rectangular box or chute called a "parlong." The water carries off the lighter particles and leaves a concentrate of rich ore with some heavy impurities that are removed by further treatment. The latter usually takes the form of washing in a land chute situated in a tin dressing shed.

With a few exceptions, the most modern and best-equipped mines are either lampans or lumbongs. In the former water is brought to the tin-bearing ground and used to concentrate the ore on the spot, while in the latter the ore-bearing ground is excavated and taken to the nearest available water supply for concentration. In both cases the same principle is employed as in the old native mines, but with the greater efficiency resulting from the use of machinery in the form of gravel pumps driven by steam engines or, more recently, electric motors. The most efficient way of working where the alluvial deposit is of an approximately even depth, and where limestone pinnacles do not occur, has been found to be by the use of floating bucket dredgers. These are being employed in increasing numbers, as they are capable of working ground which could not be exploited economically by any other method. The great and increasing demand for the metal and the necessity of treating the lower-grade deposits has led to the building of larger and electrically operated bucket dredgers. Fig. 1 shows such a dredger at work in typical Malayan mining country.

The method of working the dredgers is such that they must have the least possible draught, usually from 8 to 10 feet, and it has been found that electric operation of the machinery on board, in conjunction with generating plant installed on solid ground ashore, gives by far the most efficient arrangement. At the same time the availability of an electricity supply for general lighting and power purposes throughout the mine area is extremely convenient. Another factor which is influencing this development is the advent of the Perak hydro-electric undertaking, and it is probable that this will lead to the almost universal adoption of electric driving with a considerable reduction in operating costs throughout the tin fields.

In setting a dredger to work an excavation some 250 feet square by 12 to 14 feet deep, large enough to float the dredger, is made by manual labour. The chain of buckets, which are usually of manganese steel, is then set to work at the bow of the dredger and cuts away one side of the pool to the depth of the deposit, bringing up the tin-bearing ground, which is conveyed to the disintegration screen and washing machinery occupying the remaining deck space at the stern end.

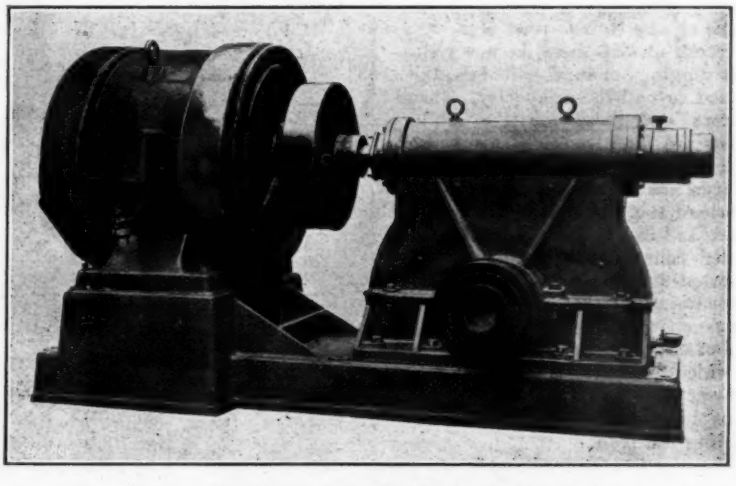


Fig. 2.—Splash-proof Induction Motor Driving Unit.

This washing machinery is of two kinds, the jig, and the classifier or box; the former is the latest design and is now being extensively employed. The tailings or waste material is washed down a chute that extends approximately 50 feet beyond the stern of the dredger on each side, and is deposited on the stern side of the pool. In this way the dredger carries out the excavation as it moves along.

The dredger is moved broadside across the pool, and on each journey to and fro it is also advanced slightly. Thus the pool and dredger progress in any desired direction, the tailings filling up the ground behind. In some cases the dredger may start its operations from a river bank, should the geographical situation of the property allow of this. The movement of the dredger is effected by heavy winches on the deck operating ropes made fast ashore, one at each corner, and in front of the dredger.

Fig. 3.—Totally-enclosed Slip-ring Motor.

The design of electrical plant suitable for use in the F.M.S. necessitates consideration of the very severe tropical heat and humidity, as well as the presence everywhere of large quantities of water; therefore all the motors for this service are of the totally-enclosed, drip-proof or splash-proof types. Examples of motors of these types for some of the smaller drives are shown in figs. 2 and 3. Some of the duties are extremely severe and call for motors having a heavy overload capacity; for example, the bucket excavators are liable at any time to meet tree roots or rock, and if these do not yield, the digging motors will be overloaded beyond their capacity. These motors and those for the ladder hoists are often required to operate at low speeds for long periods. Safeguards are provided in the form of overload trips on the motor control gear, and in some of the equipments under construction resistances are inserted automatically in the motor rotor circuits before the circuit breaker opens. For complete control of the motors driving the ladder to which the heavy chain of buckets is attached, the English Electric Company has in some cases adopted a system of counter-current braking for holding the load.

In order to utilise efficiently the power plant or transmission line, particularly in view of the continuous operation of the dredgers, it is found advantageous to adopt some form of power-factor correction where the supply is a three-phase one, as is usually the case. As the main pumps run continuously at an approximately constant load, the company has in suitable cases supplied asynchronous-synchronous motors for these drives, and thereby effected a considerable improvement in the power factor of the dredger load as a whole.

A typical dredge equipment may consist of the following motors:—Digging motor (150 to 250 h.p.); ladder hoist (120 to 200 h.p.); mooring winch (25 to 35 h.p.); screen (50 to 75 h.p.); high-pressure and low-pressure pumps (150 to 250 h.p.); service pump (30 h.p.); ballast pumps (15 h.p.); logging winch (20 h.p.); and compressor and workshop motors.

Since the dredge is operated continuously day and night, and in many cases solely by natives, the motors, control gear, and other parts of the equipment have necessarily to be as simple and robust as possible. As an example of power-station equipment reference may be made to the Bangrin Tin Company, for which three dredger equipments have been shipped. There are three 500-kW sets, each consisting of an "English Electric" alternator directly coupled to a high-speed Belliss steam engine, and generating three-phase energy at 50 cycles and 3,300 volts. These sets are installed in the stationary power house and supply an overhead transmission line which can be extended from time to time to follow up the progression of the dredger. Connection between the line and the dredger is made by a length of special armoured and waterproof cable. Another equipment, in this case for the Punchong Tin Dredging Company, is believed to be the largest yet projected for the Malay States. The necessary power will be transmitted at a pressure of 6,600 volts and transformed by three transformers, each of 500-kVA output.

Electricity generated from water power is destined to play an important part in the development of the tin mining and other industries of the F.M.S. In addition to the large scheme of the Perak River Hydro-Electric Power Co., for which three vertical-type water-turbine alternators are in hand, each of 12,350 kVA, the Company has also been associated with the development by one of the mining companies of a large water-power station. Fig. 4 shows an erection view of one of the alternators with the runner of its impulse water turbine. Two complete units are being supplied for operation on heads of 500 and 600 feet. The outputs of the turbines are 1,560 and 1,650 b.h.p. respectively, and the alternators will give a 3-phase, 50-cycle supply at 3,300 volts.

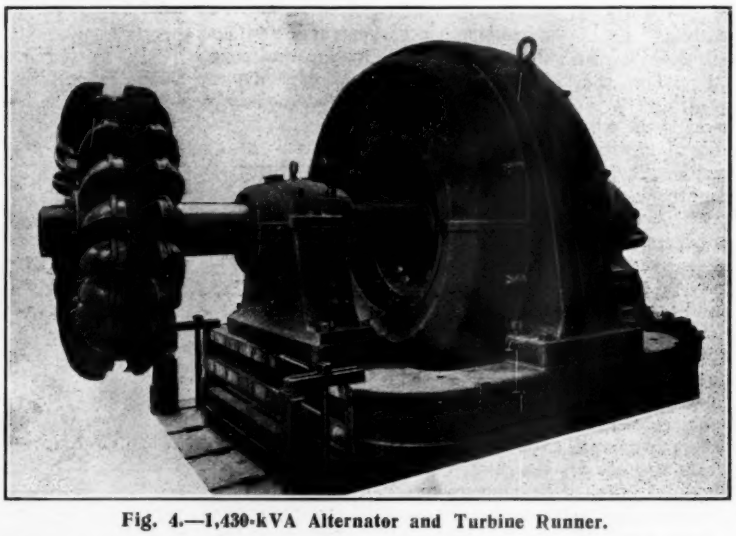


Fig. 4.—1,430-kVA Alternator and Turbine Runner.

There are a considerable number of dredgers at present working in the East operated by steam power, but there is no doubt that the many advantages of electrical operation will lead to their conversion to this form of drive. Not only is the space on an electrically operated dredger more usefully employed, but the efficiency of the plant is increased by the elimination of steam plant working under unfavourable conditions with heavy mechanical transmission.

An interesting feature in connection with the two turbine-alternator sets referred to above, fig. 4, is that in each case the turbine runner was cast in one piece complete with the buckets.

A New Network Box.

The "Metesco" unit-type box, which has been designed for the Metropolitan Electric Supply Co., is suitable for extension in any direction and to any degree.

By C. G. WATSON, M.I.E.E.

TO meet the demand for an underground network box capable of being operated by one man, of distinctly separating the connections of one cable from those of another, of being extended without interruption of supply, and of being split into sections each of which may be fixed where room is available, a new type of box has been developed. This is built up of

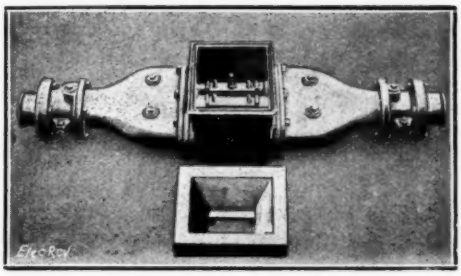


Fig. 1.—Two-way Box without Provision for Extension.

units in such a manner that from two to as many ways as may be needed can be fixed either at one or different times, in one shape or in another, and all together in one place or in separate places, whichever suits the situation best; all units fixed after the first has been made alive can be connected up without interruption of the supply or jointing live cables, and the lids are so light that they can each easily be lifted by one hand.

The units comprise a cable dividing box, a link or fuse box, and a bus-bar box. The dividing box is of cast-iron, with a brass wiping gland for connection to the cable sheath, an armour clamp which completely encloses all parts of the cable disturbed during jointing operations, and a cast-iron flange-plate holding the porcelain insulators through which pass the conducting rods from the cable cores to the contact blocks. The conducting rods are jointed to the cable conductors by means of ferrules, as in a straight joint. The link box is a hollow cube of cast-iron with a bell-shaped lid and an opening in each of two opposite sides. To one of the sides with an opening the dividing box is bolted so

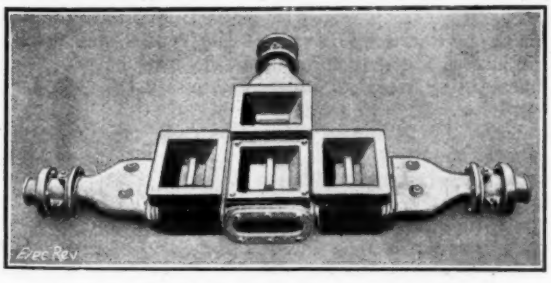


Fig. 2.—Three-way Box with Extension Facilities.

that the insulators and contact blocks project into the box. To the opposite side is bolted the bus-bar box, the contacts of which are connected to a set of insulated supports in the link box by means of copper bars. Connection or disconnection of the cable is effected by copper links bolted on the one side to the cable contact blocks and on the other side to the bars connecting to the bus-bar box. The bus-bar box is also a hollow cube of cast-iron, but with an opening in each of its four sides, and the top is closed by a lid which, as it has only to be raised on the rare occasions when a fresh unit is being fixed, is bolted to the body of the box. It contains four sets of contacts appropriately connected by bus-bars which are moulded into a block of insulating material, leaving only the contacts exposed. The openings not in use are closed by blanking-off plates which may readily be removed when occasion requires.

The units can be bolted together in ways too numerous for each separately to be specified, but fig. 1 shows a two-way box without provision for future extension; fig. 2 shows one arrangement of a three-way box, which may be enlarged to any desired extent; and fig. 3 shows one arrangement of a four-way box which also may be enlarged as desired. When space limitations prevent the required link boxes from being installed in one manhole, a dividing box may be coupled direct to the bus-bar box and a link box installed in any convenient position.

The new box is called the "Metesco" network box, after the Metropolitan Electric Supply Co., for which it was designed and by which, in conjunction with the writer, it has been patented. All the parts are of robust construction and, where necessary, of ample conductivity, and, considering the wide range of the box, few in number. The boxes have been so made by Messrs. Sykes & Dyson, Ltd., that all parts are interchangeable in their proper places. The purposes of the box would be partly defeated were the manhole cover not also of such size that one man could handle it. Accordingly, a frame and cover have been designed so that standard parts can be assembled in as many ways as are necessary, and proportioned so that one man can lift the cover.

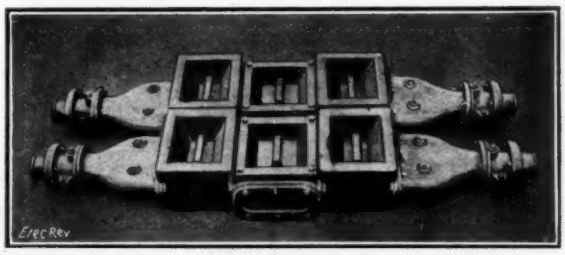


Fig. 3.—Four-way Box Designed for Extensions.

Fig. 4.—Automatic-hold or -release Spanner.

In conclusion, it may be stated that this box, while capable of adaptation to any variety of contacts, has so far only been made with horizontal contacts threaded for set-screws. Further, as in operating there is always the danger that a nut or screw may accidentally be dropped, a box spanner has been made which will automatically hold a nut and release it at will. Fig. 4 shows such a spanner.

Machine Tools.

"British Machine Tool Engineering," the bi-monthly journal of the Associated British Machine Tool Makers, Ltd., for March-April, contains a great deal of descriptive matter, with numerous excellent illustrations relating to various classes of machine tools made by its members.

The National Register of Electrical Installation Contractors.

The Other Side of the Picture.

By FREDK. W. PURSE, M.I.E.E., M.I.Mech.E., Member of the Registration Board.

WHATEVER else may be said of the articles that have recently appeared in this paper by Mr. Taunton and Mr. Pinto respectively, they have at least provided some advertisement for the Register, and the weakness of the complaints, if they may be called such, only demonstrates the sure and solid foundation upon which the Register is being steadily built. The complaints, trivial though they be, nevertheless call for some answer, and it is proposed, therefore, to deal with these in conjunction with an exposition of the main features and procedure of registration.

Let it be first made clear that the N.R.E.I.C. was not a product of the Electrical Contractors' Association. It emanated in the first place from the Wiring Rules Committee of the Institution of Electrical Engineers, which reported to its parent body the desirability of there being some means by which the public could distinguish a competent and reliable contractor from those professing to be able to undertake electrical installation work. The Council of the Institution consulted all interested parties, and it is they who were jointly responsible for ultimately establishing the National Register. This was at the beginning of 1924, *i.e.*, barely four years ago, and not five years as stated by Mr. Taunton.

It was the writer's original opinion that contractors should not in any way be associated with the management or control of the Register, but further consideration showed the desirability of their having representation on the governing body, and subsequent experience has proved the value of their assistance, but if Mr. Pinto's suggestion is appreciated aright, it is that the Registered Contractors, as such, shall control the operations and expenditure of the Registration Board and shall have a right to demand any or all the information they desire according to their whims and fancies.

If the National Register is to retain any semblance of public confidence, it can only be by maintaining complete independence; whoever heard of the purchaser of a motor-car demanding to control the affairs of the company which supplied it, or the student demanding to control the examining body which is responsible for granting him a certificate?—and equally by what process of reasoning can Mr. Pinto demand, for the "exorbitant" sum of £1 per annum the right to control the body whose clear duty to the public is, in the words of the Articles of Association, "to afford the means of distinguishing electrical installation contractors who shall have given evidence of their competency," &c.?

No, Mr. Pinto has gone off the track when he attempts to dictate as to how his twenty shillings shall be spent.

The remainder of Mr. Pinto's criticisms on finance evidently are all worked up in wrath at the refusal of the Registration Authority to surrender its independence at his behest. He complains of inefficiency and discourtesy and the disgust of the present *régime;* all, no doubt, because Mr. Pinto was not instantly obeyed.

He complains of inefficiency and an expenditure of £689 on secretarial and clerical services, which incidentally also includes legal assistance; if he was aware of the vast amount of internal office work that is entailed he would transfer his complaint of inefficiency to the large number of people (including electrical contractors) who know not how to conduct correspondence.

It is to maintain the efficiency of its work that the National Register must of necessity have a competent and efficient secretarial staff, and Mr. Pinto's criticism is made in complete ignorance of the work involved.

If further money was available, it could no doubt be used to extend the amount of propaganda and publicity work, but it might interest Mr. Pinto to know that a special campaign involving an expenditure of £324 was undertaken during the latter end of 1925, but no spectacular influx of new applicants could be traced to this; at the present time a complete list of all registered contractors is issued regularly to various interested persons, such as architects, consulting engineers, and other purchasing authorities, totalling many thousands, also printed enclosure cards are supplied free to each registered contractor according to his demand.

To reach the general public who are daily responsible for placing orders for installation work would require a sustained advertisement prominently displayed in the daily Press throughout the United Kingdom and Ireland and at a cost to the National Register which, in Mr. Pinto's own words, "no business man could tolerate."

Surely, if propaganda of this sort is desired, is it not up to the Registered Contractors in each area to join together and issue their own advertisement in their own area? They could then have that wonderful control which Mr Pinto so ardently desires.

Turning to Mr. Taunton's criticisms, they would appear to be as follows:—

(1) Incompetent contractors are registered.
(2) There are competent firms still unregistered.
(3) That the E.C.A. should in some way be linked with the N.R.E.I.C.
(4) Lack of co-operation with other interested bodies and persons.
(5) No compulsory standard of wiring as a condition of registration.

Let us consider these points *seriatim.*

(1) *Incompetent contractors are registered.*

It will be useful in relation to this criticism to set out the procedure adopted in dealing with applications.

On receipt of the application form duly filled in, it has to be carefully examined to see that all the information called for is supplied, and in very few instances is this the case, and lengthy correspondence is frequently necessary in order to get the applicant to disclose such particulars of his business and past history as to enable his application to be properly considered; doubtless some suspicion in regard to imparting information to his competitors may be responsible for this, and it only emphasises the desirability of the National Register maintaining complete independence so as to kill such suspicion.

When the full information has been obtained, corroboration of it is sought from the various suitable channels, after which the application is submitted to the appropriate Local Advisory Committee for report; the words "advisory" and "report" should be carefully borne in mind. These Committees have three members nominated respectively by the Institution of Electrical Engineers, the supply authority, and the Contractors' Association, and it has been urged that they should have more discretionary power, but what could be more calculated to destroy the value of registration than the fact that local influence and prejudice could operate to prevent any person or firm from being registered?

Full information having been first obtained by the head office, it remains for the Local Advisory Commit-

tee to report if the information is correct as far as it lies in their power, to make such local investigations as they consider desirable, and to supply any further information they consider essential to enable the Registration Board to come to a decision in the matter. If all the requirements of the Register are shown to be complied with and no evidence is submitted of shoddy work or unsuitable qualifications, how can it be said that incompetent firms are registered? Moreover, if by some devious means an unsuitable contractor has slipped on to the Register, it must not be overlooked that *each year*, before the Registration Certificate is renewed, all the names are put before the respective Local Advisory Committees for review, and if any of the seven contingencies enumerated in the conditions of registration have been infringed, the penalty is cancellation of the certificate.

If an incompetent contractor is allowed to remain on the Register year after year, then the particular Local Advisory Committee, of which one is a registered contractor, is sadly failing in its duty in not so reporting to the Registration Board; and how else is the information to be obtained? Even an expensive army of travelling inspectors would have to depend, to a large extent, upon information obtained locally so that this can well be supplied direct instead of through an inspector.

(2) *There are competent firms still unregistered.*

It is an old saying that "you can take a horse to the water, but you cannot make it drink," and how can you force anyone to become registered?

Government intervention is suggested, but for many and various reason, too long to discuss here, this is out of the question at the present time, and more especially after the miserable failure of the Architects Registration Bill recently before Parliament.

Some suitable but unregistered contractors claim that their standing is sufficient without registration, but overlook the added importance that can be attached to their claim if they are able to point to the certificate of an independent body in support thereof.

Another objection urged is that of the large and small contractors all being classed together, and some method of grading is suggested.

Something on the lines of grading of hotels by a certain motoring association, it is suggested, might be adopted, but it is at once obvious that the two cases are not parallel, and, on the contrary, would it be suggested that the members of our premier Institution should be graded, and is any objection taken by our foremost men of science and engineering being classed as "Chartered Electrical Engineers" in company with the humblest of the rank and file? It would be snobbery of the first order.

Let us examine the problem a little deeper, however; who is it that these superior unregistered contractors depend upon for their reputation? Why, the ordinary wireman in the first instance, coupled with the extent of supervision adopted; the more reliable the wireman the less the supervision; and yet, because this reliable wireman, or possibly the foreman, with a commendable spirit of independence, desires to start business on his own account, he must be put in a different class from his former employers, who depended largely upon him for their reputation, and who also conveniently overlook the fact that they themselves originally started in a small way.

Another suggestion is to give some indication of those registered contractors who have done, or can do, large jobs. What is to be the dividing line, and how can the progressive small contractor ever hope to get over the dividing line if he is labelled to all the world that he has not hitherto been in the "House of Lords"?

It is up to those placing the order to select their firms, and it would be a simple matter to inquire from the registered firms the size of contracts they are accustomed to carry out. A purchaser can then classify or grade according to the order he is about to place, and ought not to rely upon an arbitrary classification of the National Register.

(3) *That the E.C.A. should in some way be linked with the N.R.E.I.C.*

This has been incidentally dealt with in earlier parts of this article, and it is sufficient to say that the value of the Register would be destroyed if the public thought, or knew, it was governed by any other than an independent body.

(4) *Lack of co-operation with other interested bodies and persons.*

What further co-operation can be suggested, as all are represented on the Registration Board except the supply companies, who refused to be represented?

A full list of interested bodies and persons is kept and, as mentioned earlier, lists of registered contractors are sent to them regularly, together with any other literature issued.

If the list is not complete, it is the fault of the contractors themselves, as they have been asked to supply names to the head office of any bodies or persons whom they consider to be interested.

(5) *No compulsory standard of wiring as a condition of registration.*

It appears to be overlooked that a Registered Contractor will forfeit his certificate if he has culpably or negligently created a risk to life or limb or serious fire hazard through the use of faulty or improper material, or by faulty workmanship, or if his standard of workmanship is materially below the standard of average good workmanship.

The Registration Board consider this is a sufficiently all-embracing power, and if those who go further and suggest a definite word-by-word code would give a fraction of the time given to it by the Board, they would realise the impossibility of going further. So long as there are numerous and sundry persons, each with their own ideas, responsible for placing orders, and so long as there are supply authorities willing to connect to their mains unlimited kilowatts provided the insulation test is in accordance with that allowed under the Electricity Acts, and so long as there is no enforceable Government standard, then it is claimed that the Registration Authority has gone to the limit in the conditions which it imposes.

One other point has been raised, but not specifically enlarged upon, by Mr. Taunton—that is, a condition as to payment of standard wages. As a matter of principle, the writer is thoroughly in accord with it, but how is a standard wage to be a guarantee of good work? A good workman cannot do a good job with faulty material, and, moreover, how is the condition to be enforced?

There are appropriate and capable bodies well able to look after the question of wages, not overlooking also hours of labour and other conditions, and it would appear that if the Registration Authority butted in it would be only meddling with a matter which was not its rightful prerogative, and would doubtless be told to mind its own business.

Let it not be assumed that a deaf ear is turned to all suggestions. Many have from time to time been made, and those which are practical and useful have been acted upon, and this procedure will continue.

The number of Registered Contractors is well over a thousand, but this cannot by any means be called a comprehensive list sufficient to cover all the work now being carried out, to say nothing of the greater volume of work which is expected to flow in in the future.

The writer would here quote from a paper he submitted to the Electrical Contractors' Conference at Brighton in 1926:—

> "What, then, remains to ensure success of the National Register which it undoubtedly deserves? The outstanding reply is Advertisement and Publicity, but until the Registration Board has sufficient funds at its disposal, it must rely upon the voluntary efforts of its members and the Press to assist."

The present number on the Register is not sufficient—the unregistered contractors predominate—and the list must be extensive enough so that whenever quotations for work are called, there must be a very good pro-

portion of Registered Contractors tendering, and until that time arrives it is well nigh impossible to say that orders must only be placed with Registered Contractors.

Tightening up the conditions of registration will not conduce to this end; increasing the fee from the lesser number will be no better; reducing the expenditure on office work would only kill the Register by starvation.

The present conditions under which contractors are registered can be said to be such that the main object is achieved, *viz.*, protection for the public, and these conditions are not too stringent to prevent the number being substantially increased to an extent which would make the Register much more effective; any serious extension of the conditions or increase in the fees would reduce the numbers and render it impotent.

After being closely connected with the Authority since its inception, the writer would repeat with greater emphasis his conclusion offered two years ago, *viz.*, Advertisement and Publicity. As Mr. Taunton rightly says, let every Registered Contractor advertise every time, and all the time, the National Register, in his shop, on all his literature, and in every advertisement he issues, and not allow any competitive jealousy to prevent him from urging all other reputable contractors in his district to become registered; let him persuade all supply authorities, consulting engineers, architects, builders and others, to place their work, as far as possible, with Registered Contractors; and let him offer constructive and not destructive suggestions on the value and work of the Registration Authority.

To use an American phrase, Registration, to be a success, has got to be "put over" to the public, and this can only be done by each and every one talking, shouting, preaching and advertising registration whenever and wherever the opportunity arises.

Stop putting up "Aunt Sallies" and then knocking them down; stop talking about secrecy; stop magnifying personal grievances under the guise of clerical expenses, but work together, pull together for Registration.

Mr. H. R. TAUNTON replies.

I FIND it difficult to reply to Mr. Purse's article; for where he does not agree with me, he disagrees so mildly that he almost persuades me there is no difference left between us worth the arguing. There is, however, a fundamental difference: that of outlook. His is naturally that of a nominee to the Registration Board of the Incorporated Municipal Electrical Association; mine that of the humble contractor for whose interests and ideals he, as might be expected, betrays a certain lack of sympathy.

In nothing is this more evident than in his lecturing of Mr. Pinto for venturing to suggest that contractors should control the operations of their own Register. He asks, sarcastically, if the student should control his examiners or the buyer of a car the company that sells it. But closer parallels must surely have occurred to him. Do not doctors control their own "register" and lawyers theirs; plumbers and bricklayers, each their own standard of qualification? Why, then, is it so absurd to suggest that electrical contractors should do the same?

It was Mr. Purse's "original opinion that contractors should not in any way be associated with the management or control of the Register." Why on earth not? The answer he gives is unconvincing; his real answer, however, can be read between the lines. He must forgive me if I am wrong in reading there an attitude—probably unconscious—all too common in the electrical industry, whose members are divided into sheep or goats by the way they are paid for their work: by salaries and fees, or by sordid profits. The "professional" man is prone to look down upon the contractor as a "tradesman": an understandable relic of Victorian snobbery, but hardly one to appeal to the modern contractor.

That alone lies at the root of Mr. Purse's obvious conviction that contractors are not to be trusted to administer their own Register: the feeling that, as tradesmen, they are ignorant bunglers, swayed by narrow self-interest, and apt, if not sharply watched, to descend to subtle knavery. So the Olympians of the industry have, in their wisdom, taken the matter out of their hands, condescending to define for them the standards to which they must conform to gain their august approval. If a contractor can satisfy them by "evidence of competency," they graciously allow him to parade a pretty monogram—which, quite usually, they themselves ignore when they have occasion to descend to the market. And having done so much for him, they only ask that he shall not remind them of his insignificant existence by "trivial complaints."

Although Mr. Purse, as an active member of the Board, may find it hard to believe, the truth is that the only section of the industry which is really interested in the operations of the Register is the contracting trade, to which he grudges a voice in it. If it were to vanish to-morrow, who else would turn a hair? The municipal engineers? The wholesalers? The consultants? Yet of the twenty-five members of the Board, a feeble minority of seven—the nominees of the E.C.A. and the Scottish Contractors—alone represents the one body to whom, weak and faulty though it be, it has some significance, as a stepping stone to something better and a possible weapon in the fight against their greatest enemy, the jerry wireman. They alone want it, they alone need it. And they are told they must be content to leave its control, and the chance of its continuance, to the indifference of those who do neither one nor the other!

Mr. Purse is at pains to impress upon us that, not the E.C.A., but the I.E.E., was responsible for the genesis of the Register. That will open the eyes of the many who have been under the impression that it was founded and is maintained almost as much in the interests of the contractors as in those of the public. Most of us, who had forgotten its early history and never troubled to read its articles of association, had come to look upon the N.R.E.I.C. as being in close association with the E.C.A., and on the latter's inadequate representation on the Board as in practice counterbalanced by its preponderating influence. In fact, there was a general, but, of course, quite mistaken idea, that the presence of other "interested" members on the Board was by an act of courtesy, and possibly of policy, on our part. We are now put severely in our proper places.

Our disillusionment should make more cogent the suggestion that the N.R.E.I.C. should be absorbed by the E.C.A. If we who are mainly interested in it are not to control the existing Register, let us have a Register that we can control. What real argument is there against it?

Mr. Purse's first objection, not actually expressed in words, is that we are not to be trusted like, for instance, doctors, to keep our standards pure and undefiled. . . . Let us pass on to his next.

"Complete independence," he says, is necessary to kill any suspicion on the part of an applicant that he might be imparting information to competitors as to his business and past history. But even now that objection stands, since there are *some* contractors on the Board. On the other hand, it could easily be removed if, as has been suggested, the qualification of "business standing" were waived.

He goes on to assert that if advisory committees consisted only of contractors, "local influence and prejudice" could operate to prevent an applicant being registered. It is much more likely to do so under present conditions. I gave an example in my recent article. In practice, of the three members, the nominees of the I.E.E. and the supply company are as likely as not to

know nothing about the applicant; so that the virtual decision rests with the third member—a contractor. Surely a committee of several contractors, such as would be appointed if the E.C.A. were in control, would be better than the *ipse dixit* of one!

Mr. Purse criticises the suggestion of grading members of the Register. There is much in his arguments; but his reference to the absence of grading in the Institution is hardly a happy one. Has it not its students, its associates, and its members? Some such grading of registered contractors would in certain cases be desirable and on broad lines is not impracticable.

Mr. Purse's only other serious objection is that "the value of the Register would be destroyed if the public thought or knew it was governed by any other than an independent body." Why? The layman's trust in his solicitor is not lessened by the knowledge that the roll of solicitors is controlled by solicitors. Moreover, it is pretty certain that not one in a million of those who notice the N.R.E.I.C. monogram on a contractor's notepaper knows—or wants to know—that the Register is under alien control. If they consider it all, they are more likely to assume that, like all other trades and professions, the contractors have set up and manage their own Register.

With the last third of Mr. Purse's article I cannot quarrel, inasmuch as the opinions he there expresses so ably coincide with mine in all essentials. I would only suggest that his stand on the principle of fair wages might have been more definite. It is true that a standard wage is not a *guarantee* of good work; but, besides eliminating unfair competition, it does make good work more probable. Cheap labour is only cheap because it is usually unskilled.

To sum up: I think the impression most of us will get from Mr. Purse's pleasantly temperate defence of the Register is that it voices the aloof views of that large majority of the Board of Control which is unfortunately, but very naturally, out of touch with the real feelings of those interested in it—the contractors themselves. It is obviously on their support that the success of the Register depends; and that support will soon and certainly be withdrawn if the too-complacent Board makes no attempt to meet their wide-spread dissatisfaction It is to be regretted that contractors, perhaps—let us hope—because they are too busy, are not very vocal. If every contractor of the Register would only take the trouble to write to the Review an expurgated edition of the opinions he expresses so freely in conversation, we might hope to startle the controllers of our Register into action. Or if not them, perhaps the E.C.A.!

Wireless and the Supply Engineer.

Some considerations regarding the use of Battery Eliminators.

By R. H. RAWLL, A.M.I.E.E., A.M.I.Mech.E.

In the average home, broadcast receiving apparatus has now become a normal piece of domestic equipment, if not an actual necessity. This comparatively recent development has presented to supply engineers several new problems, a brief consideration of which may be perhaps of interest. It is also proposed to deal only with this subject as regards d.c. networks supplied from rotary sub-stations or mercury-arc rectifiers.

Complaints of a disconcerting audible hum are sometimes received from consumers who operate their wireless sets by means of the usual low- and high-tension batteries. This noise usually disappears when the main switch is opened, and appears, therefore, to be picked up by the wireless set from the wiring of the house. This interference is commonly attributed to the commutator ripple of the supply undertaking's converting plant. An investigation was carried out by the writer a short time ago into a complaint received from a firm manufacturing wiring apparatus, that it was unable to thoroughly test its products on account of a crackling noise of a particularly objectionable character. The apparatus in question was worked by means of batteries. By opening and closing the main switch it was proved that the interference was introduced into the building by means of the supply cables. The disturbance was only present between 8 a.m. and 12.30 p.m. and again from 1.30 p.m. to 5.30 p.m.; at all other times reception was quite perfect. Since these particular hours are those of the average factory, it seemed to point to another works being the cause of the trouble. With the co-operation of their respective owners, each of the works connected to the same distributor was shut down momentarily in turn, in order to try to locate the cause of the trouble, but without success. From these tests the conclusion was reached that the cause of the trouble was evidently due to a motor in some works sparking badly at the commutator, and thereby injecting a harmonic into the surrounding supply network. It will be realised that such a disturbance on one feeder will in all probability affect all the other feeders connected to the same set of bus-bars, and thus make itself felt over quite a large area.

The inconvenience caused by the "click" emitted from a loud-speaker, due to induction between the house wiring and the wireless set when a lamp is switched on or off, is, of course, negligible, but the interference occasioned by the continual starting and stopping of thermostatically-controlled apparatus, such as refrigerators, particularly if they are of the electric motor type, in many cases is quite considerable. Amongst the remedies which have been tried to cure this trouble may be mentioned the screening of the apparatus itself, and the insertion of filter circuits in the leads to the motor. It is on record that in one locality a refrigerator was causing such trouble to the owners of surrounding wireless sets that they clubbed together and presented the guilty party with the necessary apparatus to provide a remedy!

In order to prevent the inductive action between the wiring of a building and a wireless set, some people advocate the use of a wiring system enclosed in a metallic sheathing efficiently connected to earth, while others prefer a non-metallic system, such as c.t.s. The latter base their preference on the fact that, although interference may be obviated by metallic sheathing, the presence of metal connected to earth introduces a greater advantage in respect of unwanted capacity effects.

Where the so-called battery eliminator is connected to the d.c. supply mains, it is generally used to replace the high-tension battery, and usually consists of a high-resistance potentiometer in conjunction with a filter circuit composed of a combination of condensers and choke coils. The purpose of the filter circuit is to absorb any oscillation present in the supply current which is likely to cause interference with the receiving set. Even with a carefully designed battery eliminator sometimes quite a pronounced hum is heard in the loud-speaker circuit. It can be shown that a hum may be present which is not due to the supply current at all, but is caused by a particular combination of values in

capacity and inductance in the eliminator and wireless set themselves. Noises of an intermittent character are sometimes heard in head-phone and loud-speaker circuits supplied from eliminators, which are due to inductive interaction between cables in the network. It often happens that supply distributing cables are laid in close proximity to tramway feeders; the ever-varying currents in the latter act inductively on the former, and hence on the wireless set by way of the service cable and eliminator.

When it is realised that the current taken by a battery eliminator is practically negligible—in most cases it is not sufficient to rotate the meter—supply undertakings can hardly be expected to take steps to render their networks free from these disturbing harmonics, and, therefore, it is only fair that the consumer should provide his own remedy in the shape of properly-designed filter circuits.

Requests are often made by prospective consumers to connect their installations to the positive outer of the 3-wire system. The reason is that eliminators in many cases function indifferently when connected to the negative outer. It is somewhat of a mystery why this should be so, because theoretically there should be no difference in the performance whichever outer is utilised. From the supply point of view it is not always possible to accede to such requests, on account of the necessity of balancing the load on the network as equally as possible on each outer.

When the supply for the plate circuits of a wireless set is obtained from the mains, care should be taken that all bare terminals are suitably protected. Although the voltage on the valves may only be in the region of 100 volts, yet it is quite possible that the *full supply voltage to earth* is still present. In properly-designed sets enclosed in suitable cabinets, there is little risk of accidental shock, but in numerous instances the apparatus consists of a mass of bare connections, which, if near a conducting floor or within reach of a connection to earth, may easily be highly dangerous. Many people are unaware that when the supply happens to be taken from the negative outer, and the aerial circuit is connected directly to the first valve, as is usually the case, the full pressure of the supply system to earth will be present on the lead-in and aerial. Unpleasant shocks have been experienced by persons in ignorance of this fact. This can be prevented by either connecting a condenser in series with the aerial, or else by inductively coupling the aerial circuit to the first valve.

Since the neutral of most 3-wire d.c. networks is earthed, unless proper precautions are taken when using a battery eliminator, serious short circuits may occur. This can be guarded against by inserting a condenser between the earth lead and the set itself, or by keeping the aerial circuit distinct from the valve circuits by means of coupling.

The most vital part of a wireless set worked off the supply mains is the lead to the loud-speaker or head-phones. Provided a double-wound transformer is inserted between these instruments and the output terminals of the wireless set, no harm is likely to ensue Otherwise the full pressure to earth may exist on this flexible. In this connection the writer has seen newly-built houses installed with plug-points for loud-speakers in each room, the wiring to which has been carried out with ordinary bell wire. This may be quite all right when used with ordinary high-tension batteries, but if the public supply mains are utilised, the effects can easily be imagined. Not only is there risk of shock from the terminals of the head-phones or loud-speaker, but, since in many cases any odd length of wire of doubtful insulation properties combined with imperfect joints is utilised when a loud-speaker is placed at a distance from the wireless set proper, there is considerable risk of fire should an "earth" take place. A fire which was caused by this very thing came to the notice of the writer recently. In this case the eliminator obtained its supply from an adaptor fixed in a lampholder. Unfortunately the tumbler switch controlling this was on the neutral and not on the live side as it should have been. Consequently, when the family retired for the night and this switch was turned off, practically the full pressure to earth remained on the loud-speaker flexible. Luckily the fire was discovered before it had assumed serious proportions. In the writer's opinion a double-pole switch should for this reason be provided on all battery eliminators. Double-pole fuses of a light character should also be incorporated in such apparatus, because often the supply is obtained from a plug-socket suitable for a radiator, the circuit fuse of which may be of the order of 25 amperes blowing capacity.

The writer does not wish to be thought an alarmist in this matter, but he feels that attention should be drawn to the risks run unwittingly by the average consumer, who, when working his wireless set from public supply mains, does not treat such apparatus with the same healthy respect as is accorded other domestic electrical appliances.

The Hire-Purchase Bill, 1928.

Further New Proposals.

By W. ERIC JACKSON, LL.B., Barrister-at-Law.

THE Hire Purchase Bill, 1927, which was recently the subject of comment in these pages (Electrical Review, December 9th, 1927) has now been dropped by its promoters. Its proposals have evidently not been considered sufficient to give that security to dealers in hire purchase which was the motive for its existence. A new measure has been substituted—The Hire Purchase Bill, 1928—and the terms of this new Bill are much more concise and satisfactory from the dealers' point of view.

The 1928 Bill is set down for second reading on May 4th. It is directed towards the same objects as the 1927 measure, but makes good certain omissions.

The Bill of 1927 was designed to avoid the risk of seizure of the goods by outside parties during the term of the agreement. Under the present law, every owner of goods who lets them out on hire or hire-purchase is open to the risk that if the hirer goes bankrupt or cannot pay the rent of his premises, the trustee in bankruptcy may seize the goods, or the landlord may take them by distress, and in many cases the owner of the goods is entirely without any possible means of redress.

The Bill of 1927 attempted to overcome these risks by providing that the hired goods should not be available for distress for rent and should not be divisible among the hirers' creditors on his bankruptcy. But the Bill only dealt with distress for rent. It did not cover the power of the local authorities to distrain for rates and taxes.

The new Bill contains extended provisions whereby no goods "comprised in a hire-purchase agreement or a simple hiring agreement" shall be subject to distress for "rent, rates, water rents, gas and electricity charges." This clause leaves out taxes, which will apparently still be a lawful object for distress, even

when the Bill passes into law. But as distress for income-tax and other King's taxes is far less common than distress for rent and rates, the dealer may consider himself suitably protected if the Bill in its present form becomes law.

Electricity undertakers may object to the exemption of hired goods from distress for electricity charges. In view of the astonishing increase in hire-purchase trading, the time may soon be at hand when every article of use or ornament in the household is the property, not of the tenant, but of some dealer who has let it on hire-purchase. Houses, pianos, motor cars, wireless sets and gramophones, furniture and even works of art can be purchased nowadays on the "easy-payment" system, which means that property can be enjoyed without ownership. So long as one earns sufficient to pay the instalments of hire, one need never save up to buy anything. The result will be probably an encouragement of thriftlessness, with the result that when bad times come, complete financial collapse will occur in the household. Everything will be reclaimed by the dealers who have supplied the articles on hire, and the unfortunate hirer, having saved little, will have little property of his own to fall back upon.

Certainly, electricity undertakers should carefully consider the effect of the Bill when extending credit to consumers. No longer will a substantial and prosperous appearance imply substantial means. "Pay as you go" will have to be the rule.

The provisions in the 1928 Bill with regard to bankruptcy are substantially the same in effect as in the 1927 measure. The goods hired "shall not be divisable among the creditors of a bankrupt hirer."

A further new provision is that goods on hire-purchase "shall not become fixtures." This provision will be of great interest to suppliers of electrical fittings. In many cases electrical apparatus will not become in law of the class of fixtures. They will be treated as domestic ornaments and will not be seizable by the landlord on the determination of the tenancy. Much electrical apparatus used in shops and other business houses will be considered as "trade fittings." Either of these classes—trade and domestic fittings—are not fixtures; but there are many articles which to-day are purchasable by the "easy-payment" system which may become fixtures and therefore claimable by the landlord.

Certain fixed machinery, heating and lighting systems and such apparatus will, if so built in as to become permanent, be the landlord's property in spite of the fact that the tenant is not complete owner of the articles.

In the case of goods supplied to companies which issue debentures, the rights of the debenture holders may collide with the rights of the dealer who has supplied the goods on hire. Such disputes have been dealt with by the courts according to complex principles which varied according as the goods were fixtures or not.

All this will be solved by the few words of the Bill above quoted. If the goods never become fixtures during the currency of the agreement, neither the landlord or the debenture holders, nor the mortgagee or any other person in a like position, will be able to oppose the claim of the dealer to seize the goods on breach of the hire-purchase agreement.

The latter portion of the 1928 Bill deals with a subject of interest to money-lenders and others engaged in financing transactions.

It is becoming the practice in many trades for the dealer in hire-purchase transactions to obtain from a finance company an advance on account of the purchase price; the company then collects the instalments from the hirer and thereby reimburses itself for the advance made to the dealer.

In such transactions it is a common practice for the hiring agreement to be maintained, so that if the hirer pawns or damages the goods, there shall be a right to recover them from him under the terms of the agreement.

The position which arises is peculiar. The dealer has been paid off. He has received his purchase price by an advance from the finance company. In a sense, therefore, he ought to have no further claim on the goods. Yet the finance company requires the agreement to be kept intact, in order that its security over the goods shall be maintained. The dealer becomes a sort of trustee for the finance company, and therefore ought not to allow the goods to be dealt with, without the consent of such company.

The Bill provides that no trust of such a kind shall exist, merely from the fact that a hire-purchase agreement is intended; and the owner's right to seize the goods is to be paramount in every case. This is only one result of the clause in question, which reads "the goods. . . . shall be removable by the owner at any time, and as against all persons, and shall not during the currency of the agreement or any time thereafter be deemed to be impressed with any trust in favour of any person by reason only that such goods may have been acquired at the request of a hirer by any person, with a view to the same being comprised in the agreement."

So if an intending hirer asks his wife to obtain an article on credit, the intention being that he shall himself enter into a hire-purchase agreement with the supplier, the wife acting as a sort of collateral surety, the dealer will be able to reclaim the goods in spite of the fact that the wife may be the nominal purchaser and may claim to have a right of the goods on that account.

The Bill of 1923 is a great improvement, from the dealer's point of view, over its predecessor of 1927, and should be welcomed as an attempt to at last confer a long-awaited and much needed protection to dealers in this class of transaction.

Correspondence.

Correspondents should forward their communications **as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

Concentric Cable Data.

I should be much obliged to any reader who would put me on the track of any measurements of the effective resistance at 50 cycles of concentric cables such as are used for underground mains.

C. G. Watson.

London, *March 24th*, 1928.

The Durability of Underground Cables.

Herewith I am sending you a sample of Siemens cable which has been in the ground here for twenty-eight years. It was cut out owing to damage by a pick hole. The sample, I think, is interesting, as showing that lead-covered armoured cable in suitable soil may be expected to have a very long life; the cable is nearly as good as new in spite of its long period of work.

C. Turnbull.

North Shields, *March 19th*, 1928.

[The sample is a section of a low-pressure three-wire-system cable, with bitumen insulation, lead-sheathed, and steel tape armoured, with a heavily compounded jute covering—all of which appears to be in excellent condition.—Eds. Elec. Rev.]

Tolerances on Poles.

Your correspondent "Ergo" omits to state whether the trouble he has experienced is actually pole failure, or foundation failure. Obviously, if a pole is designed for a straight line, any angles on the wire will throw on it a greater stress than would be permissible under the Commissioners' regulations. If, however, the line has not been built to this standard, it is quite possible that the poles may be strong enough to stand the additional load, and still have a reasonable factor of safety under normal weather conditions. If the pole strengths are calculated on the B.E.S. minimum size, and slightly larger poles are selected for use at angles, an increase in strength will be gained, as the strength of the pole increases as the cube of the radius. Should, however, the poles be designed to be sufficiently strong to carry the slight angle mentioned, and still comply with the regulations, it is obvious that such poles, if used on straight lines, will be unnecessarily heavy and expensive. In single poles the foundation strength is usually less than the strength of the poles, and although the

foundations may not fail entirely, the pole will come over sufficiently to slacken the wires and ease off the strain. By securing a couple of suitably dimensioned blocks to the pole, one 2 ft. below the ground, and the other 4 ft. below the ground, and arranging these parallel to the line, the foundation strength can often be made equal to the pole strength. Personally, I consider it better to have a few properly stayed angles and the rest of the poles in straight lines, as this gives the stronger line, and is usually less unsightly. The absence of particulars of size and type of line precludes any detailed comments on the problem in question.

D. C. Redfern.

Musselburgh, *March 20th*, 1928.

Unfair Trading.

Under the heading "Unfair Trading" (Elec. Rev., March 16th, p. 464) I regret, as a contractor, to read of yet another instance of shoddy methods, and would like to know when a "black list" will be published in your columns of manufacturers and factors who do not protect their chief customer—the much ill-used "Contractor." It is surprising to find so many of one's customers who tell you when the wiring is complete that they are getting their own fittings as they know somebody in the trade.

It is quite apparent that any employé, whether behind a sales counter or a clerk in the counting-house of a wholesale house, can have what he likes, and as much as he likes, at full trade discounts; he has only to let all his neighbours and friends know where he is employed and, of course, he is a handy chap to know.

I have just recently finished a builder's contract for wiring and switches, and, upon my inquiry regarding the fittings, the builder showed me the official list of fittings ordered from a very well-known wholesale manufacturer (not factor), from which I took the order number, date, and salesman's signature for future reference. This was accompanied by a note from the client that 33⅓ discount on the fittings and 15 per cent. on lamps was being given to him, and if I, as a contractor, could get them cheaper, I could handle the order and have the extra for myself. (How generous some of these people are!) Needless to say, I have refused to handle it.

But it is quite natural for any person to keep his expenses down, and I think the whole blame is on the wholesale houses. Another thing, because a garage does certain electrical work on a car, the owner puts "Electrical Engineer" on his bill-headings, and is allowed to buy anything electrical, but we can get a motor horn only at retail price.

Contractor.

March 21st, 1928.

Capital Charges.

In the daily Press publication of the new electricity scheme for the Midlands (*Daily News*, March 21st, 1928), the following paragraph occurs: "The annual charges on the capital outlay on standardisation will be borne by all authorised undertakings throughout the country." I should be much obliged if you could let me know what this means exactly, that is, whether a levy is contemplated on all existing stations, or whether it simply means that the charges referred to will be met out of the revenue of the Central Electricity Board, from stations taking bulk supplies.

I know you have always been interested in the development of small stations, and now that we have received permission to put in a 600-kW Diesel set, you will, I am sure, be interested in the prices which are being quoted for this plant. These are as follows:—

Engine	£9.5	per kW
Alternator and switchgear	£2.5	per kW
Building (portion of extension) ...	£0.85	per kW
Foundations	£0.5	per kW
Pipe work and sundry extras ...	£0.65	per kW
Total	£14	per kW

The period of loan is 12 years, giving annual repayments of 11¼ per cent., so that the charge per kW per annum will be £1.61. The maintenance contract over a period of years is at £0.25 per kW, which brings the total figure per kW per annum to £1.86, and I have no doubt that we shall obtain a fuel cost per unit of 0.3d. with the new plant. Under these circumstances, I think it is doubtful whether the "grid" price, when the bulk supply is available in this district (probably 1931 or 1932), will be of much use to us.

H. Wilson.

Ashford Electricity Works,
March 22nd, 1928.

[The cost of standardising frequency will be advanced free of interest to the undertakings concerned by the Central Electricity Board, which is authorised to borrow for this purpose, but the interest and sinking-fund charges will be annually repaid to the Board by the Electricity Commissioners, who will make a levy upon all authorised undertakings throughout the Kingdom to recoup themselves—not, as in the case of their general expenses, on the basis of "units of electricity sold," but "on the basis of the revenue derived from the sale of electricity other than electricity sold in bulk to authorised undertakers."—Eds. Elec. Rev.]

Registered Contractors only.

I note a request for tenders by the Bognor District Council, which I think is a very great compliment to the electrical wiring trade. The part to which I refer reads as follows:—

"All tenderers must be enrolled upon the Register of Electrical Installation Contractors."

I think I should be quite justified in expressing on behalf of the electrical contractors our thanks to the Bognor District Council for this courtesy, as, after a long experience in the electrical trade, it is about the first time I have seen any attempt made to put it on the proper footing which it has every right to be on.

It is possible such an advertisement may have appeared in connection with other Corporations without my observing it, but I certainly could not let the opportunity pass without calling attention to this one. It is quite possible that if this kind of thing is made into a regular custom we may in time—when probably most of us are too old to appreciate it—be able to describe our calling as a "trade."

R. Falshaw.

Harrogate, *March 21st*, 1928

[Bognor is not alone in this respect. Last year the Executive Committee of the Register reported that the Manchester, Hull, Wolverhampton, Bristol, Preston, Croydon, Newport, Cheltenham, West Hartlepool, and South Shields authorities, as well as the Newcastle-upon-Tyne Electric Supply Co., Ltd., had all decided that their installation work should be placed only with registered contractors.—Eds. Elec. Rev.]

Fictitious Accuracy.

In the description of the new plant at Shoreditch it is recorded that the superheater results in a final temperature of 591.9 deg. F. One can imagine the perturbation of the stoker when the engineer shouts to him, "Bill, your superheat is down 0.8 degree"!

While accuracy in measurement is highly desirable, one cannot help feeling that this is a case of too much of it. Probably the result has come from a conversion from the Centigrade to the Fahrenheit scale.

There is undoubtedly a great tendency for calculators to enshrine their results in too many figures. One otherwise excellent text book works out areas by various methods to two places of decimals, although the two figures that come before the decimals are quite different for the different methods. The point is quite worthy of attention, as fictitious accuracy is as bad in its way as actual inaccuracy.

C. Turnbull.

North Shields, *March 23rd*, 1928.

P.S.—The figure in question will be found on page 408 of the March 9th issue of the Elec. Rev., in the middle of the right-hand bottom paragraph.

The I.M.E.A. Convention at Bath.

It has come to my notice that various firms have booked rooms for uninvited representatives during the week when the Association will be holding its Convention. Whilst I fully appreciate that the Association has no control over the freedom of any person whatsoever in regard to the booking of rooms, I would like to emphasise that whilst the accommodation available will be sufficient for our own members and their invited guests, if there is a further influx of representatives of firms who have not been invited it will probably result in crowding out our own members.

All members of the Association and their invited guests will have the official badge, and any other persons present without a badge will be noted as having disregarded the official arrangements and thrust their presence upon our members to the discomfort of all.

As it is desired to definitely discourage all uninvited persons, I trust that this intimation will be duly noted.

F. W. Purse,
President, I.M.E.A.

London, *March 26th*, 1928.

Domestic Water-heating.

I have read with interest the various articles with regard to domestic water-heating and thermal-storage systems which have appeared, but notwithstanding the excellence of the suggestion put forward in these articles from the electrical point of view, from the power station point of view it seems to me they are all beside the point.

In the article in your issue of March 23rd by Mr. R. J. Hebbert, he requires an expenditure of over 17 kWh to raise 40 gallons of water from 49 degs. F. to 195 degs. F., and this for storage only.

I have for the last two years been running a small domestic boiler for household purposes, supplying baths, hand-basins, kitchen, and two radiators when required, with 50 gallons' storage capacity, running night and day on coke on an average of not more than 3s. per week. Can you beat it? Until you can, the application of electricity for domestic heating is out of the discussion.

Edward Dixon,
Director, Olliver & Addis, Ltd.

Margate, *March 26th*, 1928.

The Lead-Acid Storage Cell.

The Electric Accumulator and Some of its Uses.—*Abstract.*

AT a meeting of the Royal Society of Arts in London, on Wednesday, March 14th, Mr. Harold G. Brown, of the D.P. Battery Co., Ltd., read a paper on this subject. The chair was taken by Mr. W. McClelland, director, Electrical Engineering Department, Admiralty.

The early part of the paper was historical and mainly descriptive of the Planté and Faure types of lead cell. Dealing with modern developments, the author said that the storage batteries used in modern telephone exchanges were the largest at present manufactured. It was anticipated that batteries of upwards of 20,000 Ah capacity would be manufactured. The present capacity of secondary batteries installed in telephone exchanges and repeater stations was 13,560 kWh in London and 14,890 kWh in the provinces. The largest single battery was one of 50 volts, 10,000 ampere-hours, and during the next five years the installation of 50 such batteries was contemplated by the Post Office. It was estimated that by 1932 there would be 26,650 kWh capacity of secondary batteries installed in connection with the London telephone exchanges and repeater stations, and 49,700 kWh capacity in the provinces.

Speaking of the use of secondary batteries in submarines, for purposes of propulsion, Mr. Brown said that the capacity of the individual cells varied in different navies from 2,000 to 10,000 Ah. It was usual to operate two or more batteries in parallel, thus enabling the size of the individual cell to be reduced and rendering it a more compact and easily handled unit. At one time Planté positives were commonly used in this work, but the increasing requirements of submarine work had far outstripped the capacity obtainable from this type of positive in the limited space available. The increase of capacity, due to the introduction of the Faure type plate several years ago, had had the natural result of reducing the life of the cells, but there had since been a continuous improvement in this respect, which was being maintained. At the present time the reasonable expectation of life for a submarine cell was about five years. In large submarines a total battery capacity of between 2,500 and 3,000 kWh, with a weight of between 110 and 150 tons, was installed.

A considerable portion of the paper was devoted to the application of batteries to traction, it being stated that to-day the problem of battery transport was on a vastly better footing than it had ever been previously. Sheffield Corporation owned 75 electrically-propelled vehicles for refuse collection. The American Express Co. employed a fleet of 1,500 street vehicles; in America, however, they had forbidden horse traffic in the central areas of big cities, and that explained the difference in the positions. Two firms of electric vehicle builders were now producing a light one-ton delivery van which entirely met requirements.

The Bombay, Baroda and Central India Railway Co. had two battery locomotives on order in this country for the operation of its Bombay terminus, and they would be the largest battery locomotives yet built in this country. They were to be equipped with batteries capable of developing 600 h.p. for starting under load. In the United States a battery locomotive had recently been put into service which weighed 110 tons, and was capable of hauling a 1,500-ton train at from 8 to 10 miles an hour. The battery weighed 39 tons, being the largest ever built for this purpose, and consisted of 120 cells with a capacity of 616 kWh, and capable of discharging up to 846 kW. In this country standard-gauge battery locomotives were in use at electric power stations, gas works, engineering works, and in railway goods yards. Both the War Office and the R.A.F. also made use of battery locomotives in camps and ordnance depôts.

The author mentioned the prize of £1,000 offered by the late Mr. Charles Markham for the best-designed battery locomotive for use underground in coal mines. The locomotive which won the award was manufactured by Messrs. Joseph Booth & Bros., of Leeds, and was capable of drawing a 5-ton load up a 1-in-25 gradient at 5½ miles per hour. As a general principle it was advisable to keep the voltage of the battery as low as was consistent with the satisfactory operation of the motors. The usual industrial truck, dealing with loads of from 35 cwt. to 50 cwt., was equipped with a lead-acid battery of from 14 to 20 cells, with a capacity of 200 to 350 Ah.

Discussion.

The CHAIRMAN said that the lead-acid cell, although having a higher efficiency than the alkali cell, would not stand long on open circuit, it was not very durable, and it was costly in manufacture and upkeep. The alkali cell was also expensive in first cost, was less efficient, and had other drawbacks, and it was clear that there was ample scope for ingenuity on the part of research workers.

Col. R. E. CROMPTON, speaking from the point of view of general electricity supply, asked whether engineers were right in putting battery supply out of the question; had greater use been made of batteries there would not have been the failure of supply that had happened in London a short time ago. He was doing his best to demonstrate that in the villages of rural England batteries would be the best form of electric supply.

Mr. LL. B. ATKINSON said the lead battery had been enormously improved within the last few years, but still some revolutionary change was wanted. Some system of storage was needed, but he did not think the lead cell was the final answer.

Mr. E. T. WILLIAMS (Admiralty) said that of all the phases of electrical engineering, that connected with storage had made least progress. Those who lived much abroad realised that in new countries small towns for many years would have to develop their independent electrical systems, and that in various parts of the Empire batteries would be essential; therefore, he urged all battery makers to do propaganda work to impress consulting engineers with the really great importance of installing a battery with a small plant. The alkali cell was certainly dearer than the lead-acid cell, and had various disadvantages, but it could be left uncharged for long periods, and he believed that when they got to the stage of mass production the alkali cell would be found to have a very real sphere of utility.

Mr. W. WORBY BEAUMONT said it was a curious fact that the light electrical vehicle was not a success. The heavy electric vehicle, however, was making some headway, thanks to the work of the Electric Vehicle Committee.

Mr. E. NEW expressed regret that the author had not referred to standardisation. The Post Office had done a great deal of work in this connection, and a very strong Committee of the British Engineering Standards Association, on which all the Government Departments were represented, was now going into the matter with the hope that standardisation would do away with the chaos caused at the present time by the great number of types and dimensions of batteries manufactured.

Mr. E. C. MCKINNON said it had recently been stated that by a change of electrolyte, the efficiency of the lead battery might be much increased. In any case, the Exide battery gave a better figure than the 75 per cent. efficiency that had been mentioned for the lead-acid battery.

Mr. J. N. SOUTHERN spoke in favour of the use of storage batteries in connection with the maintenance of electricity supply.

Mr. BROWN, replying to the discussion, said that as regarded road vehicles, the difficulty was to secure adequate charging facilities, and perhaps these would not come until there was a reasonably sized fleet. If charging stations could be installed throughout the country it would inevitably lead to the greater use of electric vehicles. As to the life of cells, the figures of six to eight years for the iron-nickel cell and three years for the lead-acid cell were based on experience with electric lorries and road transport generally.

The Corrosion of Metals.

At a recent meeting of the Physical Society a paper on "The Application of Electrical Resistance Measurements to the Study of the Atmospheric Corrosion of Metals" was read by Mr. J. C. Hudson. This paper described in detail an experimental procedure for quantitative field tests on the atmospheric corrosion of metals, based on the determination of the change in the electrical resistance of wire specimens produced on exposure. The method is capable of great accuracy, and the resistance changes produced in duplicate specimens agree to within 5 per cent. The validity of the results has been established, in the case of the metals investigated, by correlation with the corresponding weight changes of the specimens. In the case of copper, it has been found that the percentage resistance change due to corrosion is inversely proportional to the diameter of the wire; it is thus possible to use the method as an "acceleration test" by conducting experiments on relatively thin wires, which are appreciably affected by corrosion within a few weeks.

In the discussion which followed, Dr. W. H. J. Vernon said that, from an economic point of view, the important matter would be the application of the method in obtaining corrosion data under a wide range of conditions. Arrangements were being made for observations at six stations engaged in research on atmospheric pollution. The method of accelerating results by reducing the diameter of the specimens was much superior to methods in which artificial corrosion was produced, since the results of the latter bore little relation to natural corrosion. Acceleration was necessary, since the later course of a corrosion process could not be inferred from its earlier stages; thus arsenical copper, for instance, was at first more rapidly tarnished, but after long exposure much less tarnished, than pure copper.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.

The Easter Holidays.

Our Advertisement Department announces that, owing to the earlier publication of next week's Electrical Review, small prepaid advertisements and official notices cannot be accepted after 5 p.m. on Monday next, April 2nd. All editorial matter must be in our hands a day earlier than usual.

The E.D.A. Circle Campaign.

Further evidence of the forward policy which is being pursued by the Birmingham Electric Supply Department is provided by the opening, in conjunction with the Birmingham Circle, of another all-electric house. This is at Stechford, a part of the city previously untouched by the campaign, and at the official opening on March 19th, Councillor H. K. Beale, the chairman of the Electric Supply Committee, said that the domestic contract tariff, recently introduced by the department, had already been responsible for a considerable increase in the sales of fires, cookers, cleaners, and other domestic electrical apparatus, and they were confident that this progress would continue. The house will remain open for some weeks, and local contractors are co-operating in advertising it.

"Park Side," the Blackpool all-electric demonstration house, was visited by several thousands of people last week. The dwelling is open for another week, and will close to-morrow (Saturday). Mr. C. Furness, the Blackpool electrical engineer, who is chairman of the Blackpool Circle, last week spoke at the inauguration of a series of demonstrations which are being given at the house. On behalf of the Circle he presented the Mayor of Blackpool (Councillor T. G. Lumb, J.P.) with an electric lamp stand to signalise the opening of "Park Side."

The Leipzig Fair.

A German correspondent states that the wireless section of the Leipzig Spring Fair has grown considerably in importance, the total number of exhibitors who had stands this year being 151. As in former years, the wireless exhibits suffered through being divided and distributed through various halls, so that it was difficult for a visitor to make certain that he had really seen the whole of the stands. With the possible exception of certain types of multiple or gang condensers, the wireless section was notably lacking in new construction, as manufacturers in general prefer to launch novelties in the autumn rather than in the spring. A German view is that the great need of the Leipzig Exhibition is the provision of a separate hall for wireless exhibits. It has always been a complaint that wireless exhibits are definitely out of place in the Haus der Elektrotechnik beside the heavier machinery which is on view there. In addition, owing to the proximity of dynamos and motors, high-frequency apparatus, electric signs, and other means of interference, any attempt at demonstration is out of the question.

Merchandise Marks Act Inquiries.

The Board of Trade has referred to the Standing Committee under the Merchandise Marks Act, 1926, applications for the marking of imported copper tubes, ball bearings, pumps of all descriptions, and vacuum cleaners. The dates of the Committee's public inquiries will be announced later, and communications should be addressed to the secretary, Mr. E. W. Reardon, Board of Trade, Great George Street, S.W.1, not later than April 13th.

Social Events.

The staff of Messrs. Abell & Smith's Electrical Co., Ltd., Worcester, held a dinner at the Bridge Inn recently. Mr. C. E. Abell presided, and he was supported by Mr. H. H. Smith, Mr. C. M. Shaw (city electrical engineer), Mr. J. H. Legge (Shropshire, Worcestershire and Staffordshire Electric Power Co.) and other prominent electrical men of the district. There were 64 guests.

The recent annual dinner and whist drive of Blackpool Electrical Trades' Association was attended by over 2,000 people. There were over 60 whist prizes, and these were presented by Councillor and Mrs. H. Wilde. The M.C.'s were Councillor Handel Wilde, Mr. G. Bentley, and Mr. O. Wilkins.

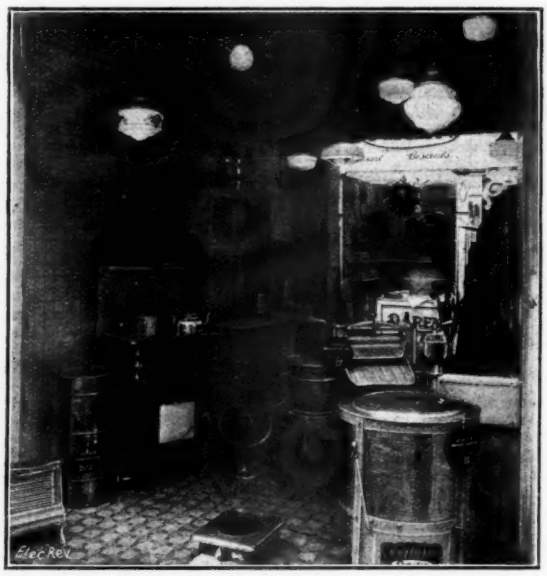
A concert version of the "Bohemian Girl," by the G.E.C. Choral Society, conducted by Mr. A. H. Spinks, was given in the Lecture Hall, Magnet House, on March 9th, before a large and enthusiastic audience. During the evening Mr. E. R. Gill gave a conjuring entertainment, and Mr. R. Hyde, secretary of the Choral Society, sang. Miss Irene Page acted as accompanist.

Conditions of Supply to New Houses.

At last week's meeting of the Stoke-on-Trent City Council, attention was drawn to a recommendation of the Electricity Committee that one of the conditions of the supply of electricity to the Basford Hall estate should be the omission of fireplaces from the upper rooms of the houses. A resolution to refer the recommendation back to the Committee was moved. In explanation, the chairman of the Committee said that unless they were assured of an adequate return they could not undertake the expense involved in the provision of mains and services, and that was one of the means by which a return could be assured. After some discussion the recommendation was approved.

A Manchester Health Exhibition.

The accompanying illustration shows the stand arranged by Metro-Vick Supplies, Ltd., at the Health and Hygienic Exhibition, which was opened at Manchester on March 20th; it closes to-morrow (Saturday). A portion of the stand was arranged as a model kitchen, and demonstrations of "Cosmos" electric cookers, the "Met-Vick" gyrator washing machine,



A Metro-Vick Stand at Manchester.

a wash boiler, and other water-heating appliances were arranged each day. The lighting of this part of the stand was carried out with white enamelled units and "Silverstone" glassware. The front portion of the stand was arranged for the demonstration of "Cadillac" and "Aspiron" vacuum cleaners, floor polishers and other electrical helps for the home. The fittings installed were selected as specially suitable for modern home lighting.

National Trades Exhibition, Birmingham.

As in previous years, the Birmingham Electric Supply Department has a stand at the National Trades Exhibition in Bingley Hall, Birmingham. The exhibits consist principally of electrical apparatus for domestic purposes, and apart from vacuum cleaners, fires, toasters, kettles, irons, fans, grills, and other small appliances, special features have been made of electric hot-water storage heaters, towel rail, shaving cabinet, and a geyser especially suitable for medical and dental purposes. Another attractive side of the stand is that showing an electric wash boiler and types of the cookers supplied on hire by the Department, and which are used for daily cooking demonstrations. Electrolux, Ltd., has a stand on which are shown the company's latest cleaners, floor polishers, and water softeners. Cleaners are also shown by Hoover, Ltd., the British Vacuum Cleaner and Engineering Co., and the Tellus Super Vacuum Cleaner, Ltd. Mr. G. Emerson, Birmingham, exhibits an interesting new form of electrical advertising device for showing rotating slides.

Catalogues Wanted.

Mr. R. S. YATES has commenced business at Market Street, Wotton-under-Edge, as an electrical engineer and radio dealer, and asks for catalogues and advertising material.

Finnish Tariff Reduction.

According to the *Board of Trade Journal* the amended tariff adopted by the Government of Finland includes a reduction of the import duty on "electric machines, such as generators, motors, convertors, transformers, choking coils, &c., weighing not more than 250 kg. (except types not manufactured in Finland, which pay 3 Fmks per kg.)." The new rate is 40 Finnish marks per kg. as compared with the former rate of 41.20 Fmks.

Unemployment during February.

The March *Ministry of Labour Gazette* states that employment in the engineering industry during February was still slack on the whole, showing no general change as compared with January. It remained fairly good in electrical engineering. The percentage of unemployed remained stationary at 8.8, but in the electrical section unemployment rose from 4.7 to 4.8 per cent. There was also increases of unemployment in the electrical wiring and contracting industry—from 6.3 to 8.1 per cent.—and in the electric cable, wire and lamp manufacturing group—from 5.9 to 6.1 per cent. In all cases, however, the proportions were lower than in the corresponding month of last year. The actual numbers of unemployed were as follows:—Engineering, 85,141; electrical engineering, 3,717; electrical wiring and contracting, 1,154; and electric cable, wire and lamp manufacture, 5,089.

Unemployment.

There was a fall of 22,750 in the number of registered unemployed during the week ended March 12th. The total at that date was 1,071,700, as compared with 1,094,450 on March 5th and 1,118,740 on March 14th, 1927.

United States Hard-Rubber Exports.

Commerce Reports states that the exports of electrical hard-rubber goods from the United States rose in value from $278,701 in 1926 to $314,357 in 1927. Canada and the United Kingdom are the most important markets for these products, accounting for 54 per cent. of the exports in 1927, against 60 per cent. in 1926 and 74 per cent. in 1925. The leading customers in 1927 were as follows:—United Kingdom $89,855, Canada $80,992, and Australia $46,037.

Industrial Peace Conference.

The first meeting of the Joint Committee for the consideration of the agenda for the Industrial Conference between the General Council of the Trades Union Congress and the representative group of employers, was held on March 21st, at Burlington House, W.1. Sir Alfred Mond was voted to the chair, and he proposed that the chairman of the next meeting should be taken by Mr. Ben Turner, chairman of the General Council of the T.U.C., and subsequently by alternate chairmen. This was agreed to. There were present Sir Alfred Mond, Mr. Ben Turner, Sir David Milne-Watson, Lord Londonderry, Lord Ashfield, Colonel Vernon Willey, Mr. George Hicks, Mr. W. M. Citrine, Mr. Arthur Pugh, Mr. Ernest Bevin, Mr. Tom Richards, Mr. Will Thorne, and Mr. Conway Davies and Mr. W. Milne Bailey, secretaries. Apologies were received from Lord Weir and Sir Hugo Hirst for their absence, as they were abroad. It was decided that the agenda agreed by the Joint Committee should be referred respectively to the General Council of the T.U.C. and the representative group of employers. It was arranged that for the consideration of the various items of the agenda further meetings should be held weekly. In view of the large field of industrial problems covered by the agenda and the importance of those problems, it was agreed that some lapse of time must occur before any complete and detailed information could be communicated to the Press.

Commercial Electrical Travellers.

The Electrical Trades Commercial Travellers' Association held the last of its social functions of the season at the National Hotel, Upper Bedford Place, on March 24th. The function took the form of a carnival dance, and was well attended. Paper hats, balloons, and other novelties added to the gaiety of the evening, and dancing was continued until a late hour. Great credit was considered to be due to Mr. J. W. Ward, vice-chairman, and Mr. A. E. Boxall, hon. entertainment secretary, for arranging a very enjoyable evening.

The British Industries Fair.

At last week's annual meeting of the Birmingham Chamber of Commerce, which is responsible for the organisation and control of the Birmingham Section of the British Industries Fair, the president (Mr. G. N. Guest) stated that this year's Fair had been a great success, and he was informed by Mr. C. Stanley, the manager, that 115,000 persons passed through the turnstiles. Forty-two new applications for space in next year's Fair had already been received, and 103 firms represented this year had applied to come in again, asking for extra space. The Fair Committee in the near future would have to consider the question of extensions. It was a matter which could not be held up, for the Fair was going to be a bigger success than ever next year.

American Electrical Vehicle Exports.

Official figures show that a total of 114 electric cars and trucks, valued at £41,400, were exported from the United States during last year, as compared with 108 and £31,140 respectively in 1926.

Local Exhibition.

DUMFRIES.—One of the principal attractions at a recent Trade Exhibition at the Drill Hall was a display of electrical appliances. Mr. W. D. Erskine, Dumfries, at whose stand representatives of the Metro-Vick Supplies, Ltd., and Kelvinator, Ltd., were in attendance, showed a large variety of domestic appliances, including a combined scrubber and floor polisher. Mr. John Murray and the Dumfries Motor Co., showed "Marconiphone" receivers, while the Magneto Accumulator Co. exhibited the "Radiogram," a combination of a four-valve wireless set and a gramophone reproducer. The firm also displayed electric fires, vacuum cleaners and artistic lighting fittings.

Trade Announcements.

Two Midland electrical construction companies, Messrs. SAMUEL WHEELER, LTD., of Smethwick, and R. WHEELER AND CO., LTD., of Oldbury, have amalgamated. The Smethwick machinery and plant is in course of removal to the Oldbury works, where the head office will be situated. The company will trade under the name of Samuel Wheeler, Ltd. The directors are: Mr. S. W. B. Stephen, J.P., Mr. Robert Green, J.P., C.C., Mr. Oscar Stephen, and Mr. Reginald Wheeler. Mr. R. Green and Mr. R. Wheeler will be joint managing directors.

The ASTRAL ENGINEERING CO. has now moved into its new factory in Alma Road, Ponder's End. The company's London office is still at Gloucester Mansions, Cambridge Circus, W.C.2.

The address of the North Wales office of the ELECTRICITY DISTRIBUTION OF NORTH WALES AND DISTRICT, LTD., is now Electricity House, Gresford, Wrexham. Telegrams: "Elecdis, Gresford"; telephone: Gresford 11.

Mr. JAMES CUMMING, late with William Auld & Sons, of Ayr, has commenced business as an electrical engineer at 108, High Street, at that town.

The address of the ANGLO-PORTUGUESE TELEPHONE COMPANY is now Stafford House, Norfolk Street, Strand, W.C.2.

The CLARKSON THIMBLE TUBE BOILER CO., LTD., Australia House, Strand, W.C.2, has acquired the business of the Austin Lighting Co., Banbury.

Mr. J. WEINBAUM, proprietor of the Stormlight Incandescent and Electrical Co., London, informs us that he has no connection with the firm mentioned on p. 533 of our last issue.

New Catalogues and Lists.

THE BRITISH THOMSON-HOUSTON CO., LTD., Mazda House, Newman Street, Oxford Street, W.1.—A comprehensive catalogue (164 pp.) of commercial and industrial lighting fittings. Illustrations and particulars of the company's London showrooms appear in a preface, and following this are numerous illustrations and details of shop-window reflectors, floodlight projectors, street lamps, handlamps, dustproof units for offices, hospitals, &c., signs, standards, glassware, &c. Publication No. L.422, illustrating about a dozen examples of the company's enclosed lighting fittings for domestic and commercial situations. Priced.

METRO-VICK SUPPLIES, LTD., Trafford Park, Manchester.—Leaflet M.S. 4,644, illustrating and describing the Met-Vick "Gyrator" electric washer, and a folder dealing with electric cleaners and floor polishers. Both publications are priced.

PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2.—A coloured showcard (about 9½ in. by 14½ in.) advertising the "Duo-Savelite" lamp.

MESSRS. PRIDEAUX & CO., LTD., Midland Lamp Works, Macdonald Street, Birmingham.—Two leaflets bearings illustrations of and notes on combined electric lamps and signs.

THE STURTEVANT ENGINEERING CO., LTD., 147, Queen Victoria Street, E.C.4.—Publication No. 1,054, describing and illustrating numerous examples of the company's steel plate fans for various applications.

THE TUDOR ACCUMULATOR CO., LTD., 2, Norfolk Street, Strand, W.C.2.—An illustrated and priced catalogue of high- and low-tension radio batteries and a folder dealing briefly with the same subject.

THE RILEY STOKER CO., LTD., 9, Bridge Street, S.W.1.—Catalogue 153, containing very full and illustrated details of the "Rileyturba" boiler furnace system.

VOLTA, LTD., Kern House, 36-38, Kingsway, W.C.2.—An illustrated and priced leaflet advertising a new model of vacuum cleaner.

Bankruptcy Proceedings.

STEPHENS & WEILL (trading as Stephens & Weill Wholesale Accessories Co.), 55, Great Eastern Street, E.C.—The public examination of these debtors was held last week before Mr. Registrar Mellor at the London Bankruptcy Court, the accounts showing total liabilities of £40,184 (unsecured £36,770) and assets valued at £1,487. A loss in trading of £24,658 was sustained in 1925 owing to the failure of a certain German manufacturer to whom they had advanced £25,000 by means of their acceptances, this manufacturer having discounted their bills with a group of German banks; during January, 1926, Weill came to an arrangement with these banks under which it was agreed that the debt of £25,000 should be satisfied by

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fresh bills of exchange amounting to £10,000 accepted by the partnership firm and payable over a term of five years. In December, 1926, Stephens went out of the business, although there was no formal dissolution of partnership, and in June, 1927, a circular was sent to the creditors suggesting that a limited liability company should be formed to take over the existing business and that shares be allotted to the creditors in satisfaction of their debts; that proposal was not accepted by all the creditors, and the present proceedings in bankruptcy followed. The debtors attributed their insolvency to losses by bad debts, losses by selling slightly below cost price, excessive drawings from the business, and losses by reason of their having financed certain German manufacturers. The examination of the debtor Stephens was concluded, but that of Weill was adjourned till May 22nd next for further investigation.

W. H. Edwards, electrical engineer, The Docks, Milford Haven.—First meeting held March 27th at the Official Receiver's office, 4, Queen Street Place, Carmarthen. Public examination April 16th, at the Shirehall, Haverfordwest.

R. M. Collier, electrician and electrical contractor, 138, Ashton Road, Oldham.—First meeting held March 28th, at the Official Receiver's offices, Byrom Street, Manchester. Public examination, April 18th, at the Court House, Oldham.

J. A. Hartigan and G. J. D. Hartigan (London Fan and Motor Co.), electrical engineers, 81, Charlotte Street, Tottenham Court Road, W.1. Trustee, Mr. E. H. Hawkins, 4, Charterhouse Square, E.C.1, appointed March 15th.

G. W. A. C. Alexandra, mechanical and electrical engineer, 10, Iddesleigh House, Caxton Street, S.W.—Trustee, Mr. E. H. Hawkins, 4, Charterhouse Square, E.C.1, released February 9th.

J. E. Cracknell, wireless supplies dealer, &c., High Street, Manningtree.—First and final dividend of 3s. in the £ payable at 9, Arcade Street, Ipswich.

F. A. Hartley and R. Hartley (F. A. Hartley & Co.), electrical engineers, 98, Katherine Street, Ashton-under-Lyne.—Trustee, Mr. F. Murgatroyd, Official Receiver, Byrom Street, Manchester, released March 14th.

F. Rippingille, agent for electrical fittings, Winchester House, Victoria Square, Birmingham.—First and final dividend of 10d. in the £, payable March 30th, at the Official Receiver's office, Corporation Street, Birmingham.

R. Hilton, electrical engineer, Kenmore, Ainsworth Road, Radcliffe, Lancaster.—Receiving order made March 19th, on debtor's own petition.

C. Nicholson, electrical engineer, 3, Lorne Terrace, East Boldon, Durham.—Receiving order made March 19th, on debtor's own petition.—First meeting April 3rd, at the Official Receiver's offices, 14, John Street, Sunderland. Public examination April 12th, at the Court House, Sunderland.

J. Tucker, wireless parts merchant, 4, Glebe Road, Kingsland Road, E.—Bankrupt's discharge suspended for three months, until May 24th, 1928.

M. D. Rosenbloom (D. Rose & Co.), electrical engineer, 25, Osborn Street, E.—Trustee, Mr. E. H. Hawkins, 4, Charterhouse Square, E.C.1, released February 22nd.

Company Liquidations.

S. E. Whiteley, Ltd., late Gartside Street, Deansgate, Manchester, radio dealers, &c.—A first dividend of 2s. 6d. in the £ has been declared. The company went into liquidation last November, and it is stated that in order to realise as much as possible of the stock in the ordinary course of trading, the liquidators carried on the business up to January 12th, and were able to dispose of stock to the extent of £2,159. The balance was sold by auction, and realised about £400 gross. The freehold premises occupied by the company had been disposed of for £2,900. The liquidators had also sold machinery and motor vans by private treaty at fairly satisfactory prices. It was further stated that Mr. S. E. Whiteley had taken over one of the three shops previously held by the company, and was carrying on business there on his own account. The liquidators state that a new company, to be styled S. Whiteley (Manchester), Ltd., is to be formed.

Gwynnes, Ltd.—Last day for proofs for dividend, April 10th. Liquidator, Mr. H. E. Burgess, Senior Official Receiver and Liquidator, Carey Street, W.C.

Private Arrangements.

Auto-Bulbs, Ltd., electric lamp manufacturers, Hatton Garden, E.C.—A conference of creditors was held recently, when it was reported that a receiver for the debenture holders was appointed on February 7th last. The company was registered in October, 1922, and carried on business successfully for some time. Finally it moved to new premises. The debentures which were held by the bank totalled £1,699. It was further stated that an offer had been received from another company to purchase the whole of the assets, and after some discussion a committee was appointed consisting of the representatives of three of the creditors. A further conference of creditors was held on March 15th, when it was decided to accept an offer of 20s. in the £, payable as to 5s. in the £ within 21 days, and the balance by three equal instalments.

Trade Mission to Australia.

In the House of Commons on Monday last, Mr. Amery (Secretary for the Dominions) stated that a mission was being sent to Australia, at the request of the Commonwealth Government, consisting of Sir Harry McGowan, K.B.E., Sir Hugo Hirst, Bt., Sir Ernest Clark, K.C.B., and Mr. Dougal Malcolm, to "confer with the Commonwealth and State Governments, with the Development and Migration Commission, and with leaders of industry and commerce in Australia on the development of Australian resources and on any other matters of mutual economic interest to Great Britain and the Commonwealth which may tend to the promotion of trade between the two countries and the increase of settlement in Australia." The mission would leave this country in August and would remain in Australia for about six months.

Book Notices.

"Wireless Loud-Speakers," by Dr. N. W. McLachlan. Pp. viii+139; figs. 86. London: Iliffe & Sons, Ltd. Price 2s. 6d. net.—Experimenters and constructors will welcome the second edition of this practical manual. The author describes in a simple manner the major principles of the design, operation, and performance of modern radio loud-speakers, chiefly large-diaphragm instruments, and some associated circuits. His style is clear and straightforward, and too technical a treatment of the analytical aspect of the subject has been deliberately avoided. In addition to the diagrams and photographs which amplify the text throughout, instructions and diagrams are included to assist the amateur to construct a loud-speaker, the salient points of the whole work being summed up in the final chapter. Intelligent study of this treatise should enable users to achieve far better results than are commonly obtained from existing instruments.

"Automobile and Radio Batteries." Second edition. By Harold H. W. Cross. Pp. vii+128; figs. 53. London: Crosby, Lockwood & Son. Price 3s. 6d. net.—The information in this book is general rather than specific, but there is a fully illustrated section on the more commercial aspects of battery service.

"Science for You." By G. Crowther. Pp. x+241. London: George Routledge & Sons, Ltd. Price 5s. net.—This book is really a series of popular essays on scientific subjects with which the public is perhaps generally concerned. Such subjects as "Earthquakes and the Earth," "The Health of Miners," "Ultra-violet Radiation," and "The Coolidge Tube" are dealt with.

The Pritchett & Gold & E.P.S. Co., Ltd., Dagenham Dock, Essex, has published a useful little booklet on the care and maintenance of accumulator batteries ("Battery Operating Hints"). It deals in some detail with charging, discharging, acid, inspection, the detection of faults, and other phases of operation.

"The House of the Lighted Window," by G. F. Sharp. Pp. 279. London: Eveleigh Nash & Grayson, Ltd. Price 7s. 6d. net.

"*Journal* of the American Institute of Electrical Engineers." Vol. XLVII. March, 1928. New York: The Institute. Price $1.

"Science Abstracts" A and B. Vol. XXXI. Part 3. March 25th, 1928. London: E. & F. N. Spon, Ltd. Price 3s. each.

"Descriptive Account and Catalogue of the Home Office Industrial Museum and Exhibits, with Explanatory Notes." London: H.M. Stationery Office. Price 3s. 6d. net.

New Italian Companies.

Among the concerns recently formed in Italy in connection with electricity supply are: La Società Idroelettrica Tirrena, Rome, capital 500,000 lire; La Società Imprese Elettrichi Morosi, Milan, capital 1,550,000 lire; La Società Idroelettrica dell Evacon, Turin, capital 5,000,000 lire; and La Società Idroelettrica Belluno, Treviso, capital 50,000 lire.

For Sale.

Preston Corporation invites offers for one 500-kW rotary convertor, with booster, exciter and starting motor, and one 1,250-kVA star transformer group of three single-phase transformers. By order of the receiver for the debenture holder of Allied Electric Manufacturers, Ltd., Messrs. J. J. Greaves and Sons will sell by auction, on April 12th, at the Mart, Aldine Court, Sheffield, the stock of bowl fittings, radiators, lamps, cables, electrical equipment, &c., removed from Paradise Square, Sheffield. Grange-over-Sands U.D.C. Electricity Department has for disposal one 50-kW synchronous motor-generator set with control panels. (See this issue.)

Recent Contracts.

Messrs. Frederick Hodgson & Co., Ltd., 24, Queen Victoria Street, E.C.4, have received the contract for the electrical work at the new film studio at Welwyn Garden City for the British Instructional Films Co. They have placed orders with the Electric Construction Co., Ltd., for 500-kW of rotary convertors, with transformers and switchboards; and with the D.P. Battery Co., Ltd., for accumulators. Contracts have also been placed for heating and cooking apparatus, automatic telephones, and a fire-alarm system.

The Società Anonima Fabbrica Isolatori Livorno, Milan (for which Messrs. William Geipel, Ltd., are the British agents) has received an order from Uruguay for 11,000 suspension insulator units. The whole of the clay and the coal used in the manufacture of these insulators are of British production

New French Companies.

A company has been formed in Paris (54, Rue de la Boetie), with a capital of ten million francs and the title La Société Electro-Credit, to finance electrical undertakings.

The Société Hydro-Electrique de la Réunion has been formed in Paris (48, Rue dela Bienfaisance), with a capital of six million francs, to establish a hydro-electric station in Réunion, a small French island in the Indian Ocean.

Lister's Diamond Jubilee.

The directors of Messrs. R. A. LISTER & Co., LTD., Dursley, Glos., have been presented by the employés with an illuminated address to mark the company's commercial diamond jubilee. Celebrations were held last year, when visits were paid to the works by a large number of interested people (*vide* ELEC. REV., January 21st, 1927, p. 94.)

New Belgian Company.

The Union des Centrales Electriques du Hainaut has been formed in Brussels, with a capital of fifteen million francs, to bring into one undertaking all the power stations belonging to a number of electrical concerns, collieries, and industrial works in the Hainaut district.

Prices of Raw Materials.

Reporting on the lead market on March 24th, Messrs. James Forster & Co. stated :—" Consumers report a slightly better demand for lead products, the rise this week in lead being probably due to this. Imports up to date this month are light, and there is no excess of prompt lead, arrivals going straight into consumption. In April, however, there is a prospect of larger arrivals, 13,000 tons from Australia and Burma alone being on the way to this country. The future is obscured by the fact that a large speculative account amounting to several thousands of tons falls due next month, and although this lead will probably be carried over to July, the mere knowledge of this holding cannot be regarded as other than a 'bear' factor in the position."

Messrs. F. Smith & Co. report, March 27th :—No change in the prices of electrolytic copper bars, sheets and rods.

Messrs. James & Shakespeare report, March 27th :—Copper bars (best selected), sheet and rod, no change; English pig lead, £21 10s., 5s. inc.

Messrs. Edward Till & Co. report, March 27th :—India rubber, Para fine, 1s. 0½d., ¾d. dec.

Lighting and Power Notes.

Australia.—LAUNCESTON (TASMANIA).—We have received from Mr. R. J. Strike, city electrical engineer, a copy of his report, together with the statement of accounts for the year ended June 30th last. The total revenue amounted to £69,193, and working expenses were £47,766, leaving a gross profit of £21,427. The figures for the preceding year were :—Income, £61,475; working expenses, £42,930; gross profit, £18,545. After payment of capital charges there was a net surplus of £5,533, as compared with £2,001 in the previous year. The electrical energy sold amounted to 7,742,379 kWh, and the maximum supply demanded was 3,477 kW.

Barnes.—LOANS SANCTIONED.—The Urban District Council has received sanction to loans amounting to £24,928, including £11,510 for mains, £10,520 for converting plant and switchgear, and £2,095 for sub-stations.

Bury St. Edmunds.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer, Mr. S. E. Day) for the year ended December 31st last, record a total revenue of £17,163, and working expenses of £9,793, leaving a gross profit of £7,370. After meeting capital charges there was a net surplus of £4,399. The sales of electrical energy amounted to 935,681 kWh, and the maximum supply demanded was 660 kW.

Carlisle.—ASSISTED WIRING SCHEME.—The Electricity Committee has recommended the adoption of an assisted wiring scheme for small consumers, including small shops, and that a loan of £5,000 be applied for to cover the cost of the scheme.

Colchester.—LOAN.—The City Council has applied for sanction to a loan of £8,000 for installing an additional 200-kVA transformer at the Lexden sub-station.

Continental.—FRANCE.—In December, 1923, the French Government decided to give financial support to a project for the establishment of an installation to utilise the power of the tides at Aber 'Wrac, on the Finistere coast near Brest. Owing to the monetary stringency, the Government has, however, not hitherto been in a position to include the necessary allocation in the annual Budget. It is now announced that the French Ministry of Public Works has given the necessary authority for the preliminary work in connection with the scheme to be proceeded with.

Coventry.—LOAN.—The City Council has decided to apply for sanction to a loan of £4,440 for mains, &c., in connection with the supply of electricity to the Wyken Grange Estate.

Dundee.—ELECTRICITY EXTENSIONS.—The engineer reported to the Corporation Electricity Committee at its last meeting that the loads in certain areas were taxing the capacity of the distributing system, and it was recommended that two sub-stations be provided at an estimated cost of £3,180, and e.h.p. and l.p. cables at a cost of £6,320. It was agreed to apply for borrowing powers.

Glasgow.—RESIGNATION OF MANAGER.—At a meeting of the Glasgow Corporation Electricity Committee on Friday (March 23rd) it was decided to approve the recommendation of the Special Committee which met earlier in the week, to the effect that Mr. R. B. Mitchell, manager of the Electricity Department, be asked to send in his resignation unconditionally. It is understood that the Committee also decided to ask the Corporation for permission to advertise for a manager. It is pointed out that this does not necessarily mean that the new official will also be engineer of the department. When Mr. Mitchell sent in his resignation, it will be recalled, he laid down the condition that the Corporation should find a position for him in the reconstructed department, or otherwise consider his past services in relation to the superannuation scheme. The proposal to advertise for a manager will come before the Corporation for confirmation.

Irish Free State.—DUBLIN.—The electricity supply for the city failed on March 24th. The Pigeon House power station is situated at the mouth of the Liffey, the water for condensing purposes being pumped from the sea. The failure was due to an unusually low tide, which put the pumps out of action. A supply was restored when the tide again rose. The tramway supply is obtained from another source, and the service was not affected.

Jersey.—ELECTRICITY SUPPLY.—Regarding the concession granted to Messrs. W. Hunter & Sons, Edinburgh, for the supply of electricity in Jersey (Channel Islands), referred to in our last issue, the only supply on the island at present is produced by a small plant at St. Helier. The main importance of the new scheme lies in the country districts, in which the quarries are situated, which will now be supplied with electricity. Messrs. Hunter have been engaged on the project for seven years, and Parliamentary powers have now been secured for the scheme. Some of the contracts, the full value of which is approximately £250,000, will be sub-let to British firms, and the whole of the material to be supplied will be of British manufacture. The work is to begin almost immediately, and the contract will be completed in about 18 months.

Kirriemuir (Forfarshire).—ELECTRICITY SUPPLY.—Following consultations with the Grampian Electricity Co. in Edinburgh, the Town Council is asking the company for an estimate of the cost of an electric lighting scheme.

Leyton.—LOAN.—The Electric Lighting and Tramways Committee recently presented a report to the Town Council on a scheme for the extension of plant, offices, &c., at the main station, and the a.c. sub-station in Sheridan Road, Forest Gate, and application is to be made for sanction to borrow £21,420 for additional plant.

Lichfield.—STREET LIGHTING.—The City Council has applied for sanction to a loan of £1,521 for the conversion of street gas lamps to electricity and for the provision of additional street electric lamps.

London. — ISLINGTON. — The Borough Council Electricity Committee has obtained sanction to borrow £7,747 for replacing rubber cables.

BERMONDSEY.—The Borough Council Electricity Committee has obtained sanction to the following loans :—Mains and services, £16,500; meters, £8,000; consumers' wiring installations (for hire), £22,000; domestic apparatus (for hire), £6,000. Application is being made for sanction to install one 500-kW convertor and transformer at Almond Road sub-station.

ST. PANCRAS.—The Borough Council has received sanction to the borrowing of £25,000 for e.h.p. feeder mains from King's Road power station to the Regent's Park and Tavistock Place sub-stations, and £56,328 for the erection of a sub-station in Arlington Road and mains extensions required in connection therewith.

Plymouth.—LOAN.—At a meeting of the Electricity Committee on March 20th, it was decided to apply for sanction to borrow £51,660 for general mains extensions in the borough.

Portsmouth.—LOAN.—The Corporation is applying for sanction to the borrowing of £9,000 to meet the cost of a relief main.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts :—

BURY ST. EDMUNDS.—Lighting : A reduction of 1d. per kWh. Heating : A reduction of ¼d. per kWh.

HAWKHURST.—*The Weald Electricity Supply Co., Ltd.*—Lighting : From 1s. to 11d. per kWh. A new all-in tariff has been introduced, the charge for the first 2 kWh per £1 of the ratable value per quarter being 11d. per kWh, and for all additional electricity consumed, 2d. per kWh.

GRAVESEND.—Electricity supplied to premises on the fixed charge (wattage) basis : 1d. per kWh instead of 2d. and 1d.

HEYWOOD.—Lighting : From 5½d. to 5¼d. per kWh.

FOLKESTONE.—*The Folkestone Electricity Supply Co., Ltd.*—Lighting : From 6¼d. to 6d. per kWh. Heating : From 2d. to 1½d. per kWh.

LONDON.—*The Charing Cross Electricity Supply Co., Ltd.*—City area—Lighting : During the winter quarters, 5d. per kWh for the first 7 kWh per 30 watts connected, and during

the summer quarters, 5d. per kWh for the first 3 kWh per 30 watts connected, all energy in excess of these quantities being charged at 2½d. per kWh. Power: 2d. per kWh. Heating: 1½d. per kWh.

City of London Electric Lighting Co., Ltd.—Lighting: from 6d. to 5d. per kWh.

The South Metropolitan Electric Light and Power Co., Ltd.—Lighting: From 7d. to 6d. per kWh. Heating: From 2d. to 1½d. per kWh for the first 100 kWh, and 1d. per kWh for all energy in excess of this amount.

Hornsey.—Lighting: First 300 kWh per quarter, 4½d. per kWh.

Ulverston.—Lighting: Flat rate, from 9d. to 8d. per kWh; domestic basic rate, from 1½d. to 1½d. per kWh; special rate for churches, from 9d. to 7d. per kWh; prepayment meters, from 11d. to 9d. per kWh; the 5 per cent. surcharge on the day rate charge is abolished.

Stoke-on-Trent.—The advance on the maximum demand tariff, for lighting of 7d. and 2½d. per kWh, to be reduced from 60 per cent. to 40 per cent; the number of kWh under the multipart tariff, chargeable at 1d. and ½d. per kWh, to be reduced from 480 to 360 kWh per quarter; the charge for supply through prepayment meters to be reduced from 9d. to 7d. per kWh, and on the lighting supply, charged on the maximum demand tariff of 7d. and 2½d. per kWh, a quantity discount is to be allowed on quarterly accounts that exceed £10 in total amount, at the rate of 1 per cent. for each £10 up to a total of £100 per quarter, and above that sum at the rate of 1 per cent. for each further £25 up to £500 per quarter.

Lancaster.—Lighting: From 9d. to 8d. per kWh.

Wimbledon.—Lighting: From 4d. to 3½d. per kWh.

Cheadle and Gatley.—Domestic lighting: Within the district, from 7½d. to 6¾d. per kWh; outside the district, from 7½d. to 7d. per kWh. Heating and cooking: From 1½d. per kWh during the summer and 2d. during the winter to 1½d. per kWh all the year round. Power: From 2½d. to 2d. per kWh.

Redruth.—Electricity Charges.—Convened by the Urban District Council, a conference of local authorities in the Redruth and Camborne area to consider the charges made for electricity, was held on Monday, March 19th. The chairman of the Redruth Council, who presided, referred to the announcement made by the Cornwall Electric Power Co., that the charge for lighting in that area was to be reduced from 1s. to 10d. per kWh. He stated that as the consumers in the Redruth and Camborne area had for years been paying 1s. per kWh, which was the maximum amount the company was entitled to charge for lighting, they had good grounds for pressing for a larger reduction than 2d. After considerable discussion a resolution was passed expressing the opinion that, taking into consideration the prices charged in other Cornish towns, there was no reason why the Cornwall Electric Power Co. should not reduce the charge for electricity in the Redruth and Camborne area to 8d. per kWh It was also suggested that the quarterly minimum consumption should be proportionately reduced, and that, failing agreement with the company on these points, the conference would recommend that steps be taken to ask the Ministry of Transport to hold an inquiry into the matter.

Somerset.—Electricity Supply.—At a meeting of the Axminster Urban District Council on March 19th, a letter was read from the company promoting the electricity scheme for Chard and Axminster asking for the Council's consent to the erection of overhead lines in the district, and intimating that it was hoped to supply electricity by the end of September. The letter was referred to the Highways Committee.

On the same day a meeting of the Chard Rural District Council was held, when it was reported that the Power Development Co. had asked for the Council's consent to the South Somerset Electricity Order. The Council adopted the recommendation of a committee that approval should be withheld until compulsory mains were scheduled for the villages. Notification was received from West of England Electricity, Ltd., that it was applying for a Special Order.

The Crewkerne Urban District Council has decided to raise no objection to the South Somerset and District Electricity Special Order, 1928.

Special Orders.—Applications have been made to the Electricity Commissioners for Special Orders by the Bournemouth and Poole Electric Supply Co., Ltd., authorising it to supply electricity in the borough of Wareham and parts of the rural districts of Wareham and Purbeck, Poole, Wimborne and Cranborne, and Blandford; the Derbyshire and Nottinghamshire Electric Power Co., to supply electricity in the urban district of Bonsall, and parts of the rural districts of Belper, Ashbourne, Repton, Sudbury, and the parishes of Codnor Park, Shipley, and Codnor Loscoe; and the Gravesend Corporation to supply electricity in part of the rural district of Strood.

Stoke-on-Trent.—Electricity in Small Houses.—At a recent meeting of the Corporation Electricity Committee, the engineer reported that he had been in communication with Mr. F. V. Hulme, architect, with regard to mains and services for supply to the houses on Basford Hall estate. Mr. Hulme is to pay £20 per house for each of the 49 houses, as these houses are erected and completed, and to undertake to wire the whole of the houses throughout for lighting, heating and power. The Committee is to apply for sanction to borrow £2,000, the estimated cost of the proposed main.

Change-over.—The engineer also reported upon changing over from 100 cycles to 50 cycles in the Hanley area, and it was decided to carry out the scheme, at an estimated cost of £850.

All-Electric Houses.—Costs of all-electric houses to the end of February were submitted by the electrical engineer, showing that the total electricity consumed had been 42,842 kWh, at the rate of 140 kWh per house per week, the total cost being £146 10s., or an average cost per house per week of 9s. 7d. In the year 1926-27 the electrical energy consumed for domestic supply was 1,100,115 kWh, at an average of 3.92d. per kWh, this including lighting, heating, cooking and power. The Housing Committee has decided to erect a further eight all-electric houses at Avenue Road, Hanley, subject to the Electricity Committee agreeing to bear the cost of the necessary electrical fittings and also any loss which might be incurred on the sale or letting of the houses in the event of the further reduction or withdrawal of subsidies.

Swansea.—Proposed New Station.—The Corporation Electricity Committee has resolved that the necessary measures shall be taken to construct and equip a new generating station to comply with any scheme which may be adopted by the Central Electricity Board for the supply of electricity in such area as it may prescribe, and that the following be recommended to the Town Council as sites from which a selection for the station can be made:—Ynys-Allan, St. Thomas, Ystrad-Isaf, and Gorse Road.

Assisted Wiring Scheme.—The Committee has decided to recommend the adoption of the following scheme of assisted wiring:—The consumer to pay an additional 3d. per kWh above ordinary rates until the following number of kWh has been consumed: Three-light installation, 550 kWh; four-light installation, 680 kWh; five-light installation, 810 kWh; six-light installation, 940 kWh; seven-light installation, 1,070 kWh. The installation to become the property of the consumer after the requisite amount of energy has been purchased.

The Corporation is to hold a special meeting to consider the above proposals.

Tilbury.—Hire of Domestic Apparatus.—The Urban District Council has decided to let out on hire-purchase at 10s. per quarter electric cookers to persons not living in Council houses, and kettles and irons at 6d. per week for 42 and 36 weeks respectively. Bowl and other fires, toasters, and other apparatus are to be supplied on outright sale terms.

Torquay.—Opposition to Scheme.—The Corporation Electricity Committee has resolved to lodge formal objections to the draft Order of the Teignmouth Electric Lighting Co., Ltd. A scheme prepared by the borough electrical engineer, Mr. F. G. Woods, based on the assumption that the whole area included in the order which the Corporation is applying for will be supplied by means of e.h.p. mains radiating from Ipplepen and Newton Abbot as centres of distribution, is to be forwarded to the Electricity Commissioners. The Commissioners are to be informed that in the event of the company's Order being refused the Corporation is prepared to amend its Order so as to include in the added area of supply the parish of Widecombe-in-the-Moor, or to apply for a further Special Order to include that portion within the area of supply.

Turkey.—Electrical Development.—A new steam-operated power station has recently been completed at Bahri-Baba, in the northern section of Smyrna, Asia Minor. The plant, in addition to supplying electricity for lighting purposes, is furnishing the power for an electric tramway in the southern part of the town. At present only one route is in operation, but others are projected.

Walton-on-Thames. — "All-Electric" Houses. — The Urban District Council has under consideration the equipping of 50 new houses to be erected on the Molesey Road site at Hersham as "all-electric" houses.

Worthing.—Loan Sanctioned.—The Town Council has received sanction to a loan of £20,000 for mains and services.

Tramway and Railway Notes.

Australia.—Launceston (Tasmania).—The report of the superintendent of tramways, Mr. R. J. Strike, on the working of the city tramway undertaking for the year ended June 30th last shows a total income of £51,342, as compared with £47,974 in the preceding year. Working expenses amounted to £39,648, as against £38,810, leaving a gross profit of £11,694 (£9,164). After payment of capital charges, there was a net surplus of £2,657, as compared with a deficit of £49 in 1925-26. The number of passengers carried increased from 4,486,587 to 4,583,647, and the car-miles run from 492,395 to 494,244.

Continental.—Switzerland.—The first programme of the electrification of the Swiss Federal Railway system is rapidly approaching completion. The Sargans-Buch section was opened for electric trains at the end of 1927, bringing the total of electrified lines of the Swiss system up to approximately 940 miles, while a further 110 miles is expected to be completed and put in operation by October next. The Federal Railway authorities estimate that electric power totalling 360 million kWh will be required during the present year.

as compared with 308 million kWh in 1927, and 243.2 million kWh in 1926. The cost of the necessary power is estimated at £426,000, as against £392,000 in 1926.

FRANCE.—Work is well advanced on the electrification of the sections of the French State railways between Paris (St. Lazare), St. Cloud, and Versailles, and between Pateaux and Issy-les-Moulineaux, and it is expected that electric trains will be running between these places by July next.

SPAIN.—During last year seven million passengers were carried on the Alfonso XIII underground electric railway, which has a length of about 9¼ miles. The number of vehicle-miles run by the trains during the 12 months was 4,687,500.

Glasgow.—HEATING ON TRAMCARS.—Encouraged by the success of experiments made this winter, the Corporation Tramways Department proposes to install electric heating installations on every tramcar before next winter. The estimated cost is £14,000.

Hastings.—RAILLESS TROLLEY 'BUSES.—Railless electric traction is to be introduced this summer, some 50 vehicles ultimately taking the place of the present tramcars. The new 'buses are of the double-deck trolley type, collecting energy from the existing overhead wires; they have been electrically equipped by the Rees Roturbo Manufacturing Co., Ltd., on the Rees-Stevens system, one of the features of which is the incorporation of regenerative control.

Leeds.—FARES.—The Tramways Committee has decided, subject to the City Council's approval, to reduce tramway fares within the borough boundary to a maximum of 2d. from the city centre.

Manchester.—UNDERGROUND RAILWAY COMMITTEE'S REPORT.—The *Manchester Guardian* states that the Corporation Tramways Committee, with other committees directly concerned, has been instructed by the City Council to consider the recently-completed report of the Underground Railway Committee. The report of the Tramways Committee, when finally approved, it is understood, will contain some interesting criticisms of the scheme prepared by the Underground Railway Committee for the consideration of the Council. The Tramways Committee is convinced that some sort of underground railway system will have to be introduced in Manchester if a solution of the local traffic problem is to be found. Several schemes have been considered without any definite proposals being formulated. The report of the Underground Railway Committee, however, has resulted in a further review of the situation, and when the conclusions of the Tramways Committee have been finally reduced to a definite form it will be found that its proposals differ materially from those embodied in the report which has been submitted for its consideration.

Southern Railway Electrification.—INAUGURATION OF NEW SERVICE.—The Southern Railway Co.'s new electrified system between London and Caterham, and Tattenham Corner was put into service on March 25th.

Telegraph and Telephone Notes.

Canada.—"WIRED-WIRELESS."—The High Commissioner for Canada in London announces that the Canadian National Railways Telegraph Department is installing, at a cost of $2,500,000, a modern high-speed telegraph system between Vancouver and Montreal, which is expected to be in operation within three months. Mr. R. W. Ball, general manager of the western region, states that the carrier current system which is being used, which is the application of audio-frequency to telegraph service, will make it possible to transmit 84 messages simultaneously, using the human voice in both directions. The new system uses two wires, whereas the old system used one wire over which eight messages could be sent simultaneously; the new service will therefore result in speeding up communication tenfold. Installation of the new equipment between Montreal and Winnipeg has already been completed.

China.—AUTOMATIC TELEPHONY.—The Telephone Administration at Mukden, Fengtien provincial capital, has decided to install automatic telephones, and has been promised an appropriation of $1,000,000 for the purpose; the installation will be completed in three years.

LONG-DISTANCE TELEPHONY.—The Department of Construction of Kiangsu province at the beginning of this year commenced to install long-distance telephones in nine districts in Southern Kiangsu. The Nanking-Lishui line is already complete, and the other lines will be ready late in the spring. A long-distance service is to be installed at Nankung, a *hsien* district in Chihli province, and between Nankung and neighbouring districts.

International Telephony.—PARIS-BRUSSELS SERVICE.—M. Bokanowski, Minister of Commerce, inaugurated the public telephone service between Paris and Brussels on March 23rd by a conversation with the Belgian Minister of Communications.—*Reuter* (Paris).

Italy.—BRITISH-ITALIAN TELEGRAPH CONVENTION.—A Royal Decree has been published at Rome putting into execution the British-Italian Telegraph Convention which was signed in Paris on October 21st, 1925.—*Reuter* (Rome).

The Telephone Service.—NEW ARMLEY EXCHANGE.—The new automatic exchange opened on March 10th at Armley is the fifth satellite in the Leeds area. Leeds was one of the first large provincial cities to be provided with the Strowger system, and has doubled its demand for telephones in 10 years, bringing the total Leeds subscribers on the automatic service up to approximately 15,000. The circuits which formerly functioned as subscribers' lines will now become available as junctions connecting the Armley satellite with the Leeds main exchange and other satellites. The new exchange is at present equipped for 700 lines, with provision for ultimate expansion to 1,200. The system is five-digit and switching selector repeaters are employed in association with outgoing secondary line switches. The two main batteries were supplied by the Alton Battery Company. All supervisory alarms terminate on one panel of the power switchboard, and provision has been made for their extension to the Leeds main exchange so that the Armley satellite can be supervised from that point when unattended.

LONDON'S SECOND AUTOMATIC EXCHANGE.—The second automatic exchange to be completed in the Greater London area was put into public service on March 3rd. Like Holborn, it incorporates Strowger equipment designed to work in conjunction with the mechanical "Tandem" exchange as the connecting link with the more remote manual exchanges throughout the area. It is at present equipped for 8,000 lines, with provision for expansion to an ultimate capacity of 10,000 lines, and it is a "Director" exchange operated by seven digits, the first three being associated with the initial letters of the exchange name, and the remaining four representing the wanted subscriber's number in that exchange.

The two main storage batteries were supplied by the Chloride Electrical Storage Company, and a 2,000-ampere circuit breaker, fitted with overload and time-limit devices, protects each battery. Charging is effected from two motor-generators, supplied by Messrs. Newton Bros. (Derby), Ltd. The whole of the equipment for the two exchanges named was manufactured and installed to the order of the Post Office by the Automatic Telephone Manufacturing Co., Ltd., and with the completion of the Strowger exchange equipment for nearly 20,000 lines in the Greater London area in four months the Post Office Telephone Department is justifying its declared policy of dealing promptly and progressively with the conversion of the entire area to automatic operation.

In connection with the automatic operation of private branch exchanges associated with the large Strowger automatic exchanges at Holborn, Bishopsgate, and elsewhere, it is perhaps not generally known that the selection of a disengaged exchange line at any time is purely automatic, irrespective of the number of such lines in use. The subscribers with p.b.x.'s of considerable capacity serving 50 to 100, or more, extensions may have only one directory listing; in other words, they have only one telephone number, but a large number of exchange lines. When an automatic subscriber dials the single number, the p.b.x. selector at the exchange automatically searches for and connects with the first disengaged trunk to the p.b.x. exactly as, but in much less time than, the operator under the manual system.

United States.—TELEPHONE DEVELOPMENT.—The *Telegraph and Telephone Age* reports that the south-western Bell Telephone Company operating in Missouri, Arkansas, Kansas, Oklahoma, Texas, and part of Illinois, has planned to spend about $36,000,000 on its construction programme. Over 18,500 miles of toll circuit will be added to the plant, including 5,400 miles of physical circuit, 1,700 miles of phantom circuit, and 11,400 miles of carrier circuit.

Radio Notes.

Australia.—PROPOSED AMALGAMATIONS.—An emphatic declaration that the Postal Department intends to insist upon the improvement and co-ordination of Australian broadcasting services was made recently by the Postmaster-General (Mr. Gibson), who said that existing licences would expire in about 17 months, but it was not the intention of the Department to wait so long for improvements in services. He was not concerned with the private affairs and financial relations of the companies. According to the *Sydney Morning Herald*, the amalgamation of four or two companies, or of four in groups of two, would not satisfy him. His view was that there should be close contact between broadcasting companies in all States. It should be possible without difficulty to arrange for the control of all stations by the one authority, whether or not each station kept its finances separately. If the one authority could be obtained it could make financial provision to cover the working of the stations in the smaller States. Merely because of a difference in population, stations in the eastern States were enabled to make good profits, while those elsewhere were in difficulties. It would not be possible to introduce differential licence fees to control the earnings of companies, and it was proper to expect that

large earnings in one State should balance necessarily smaller earnings in the others. While efforts to co-ordinate services were proceeding, it was unlikely that additional licences would be issued in cities in which stations were absorbed. It had been found necessary to refuse several applications by existing "A"-class stations for the right to broadcast in Tasmania and Western Australia. Some of the stations had offered to undertake the work without any operating fee, but it had been felt that injustice would be done to stations in those States and South Australia if the applications were granted. Mr. Gibson added that the resolutions of the Washington Conference had been received, and the re-allocation of wavelengths to Australian stations would be undertaken shortly.

Canada.—Government Grant.—It is understood by *World-Radio* that the estimates brought forward in the House of Commons at Ottawa include a grant of £38,000, which is to be allocated for the purpose of providing funds to go towards the improvement of broadcast reception conditions in Canada for listeners.

New Station.—Canada's new high-power station (CKGW), which was officially opened on March 5th, operates on a wavelength of 312.3 m., and has been temporarily listed under the experimental classification with the call 9GW, says *World-Radio*. Condenser microphones are used, such as have hitherto been employed exclusively by the (WGY) Schenectady station, but the National Broadcasting Co. is also to install similar instruments at the WEAF station. Two telephone lines, one for control, each 47 miles in length, connect the studios at Toronto with the transmitter at Bowmanville, where the aerial is supported by two steel towers 165 ft above the ground and 255 ft. above the near-by lake. The four-wire loop antenna is 80 ft. long, divided into two sections by the down-lead, of the British Admiralty pattern. Water-cooled valves are employed at 15,000 V anode voltage, and the frequency is crystal controlled. The station's equipment includes a sensitive receiver which will be kept tuned to shipping wavelengths, so that whenever distress signals are heard the broadcasting plant will be shut down. American regulations require all high-power stations to use such a receiver, and, though no similar law is in force in Canada, CKGW has conformed to the requirement.

Transatlantic Telephony.—Franco-American Service.—A telephone service between Cuba, the United States, and France (Paris) was inaugurated on March 28th.—*Reuter* (New York).

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the Electrical Review containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—Sydney.—May 16th. N.S.W. Government Railways. One water-tube boiler and accessories for Zara Street power house, Newcastle. (Spec. 10s.)

July 18th. Six water-tube boilers and accessories for Ultimo power house. (Spec. £2.) Chief Electrical Engineer, 61, Hunter Street, Sydney, New South Wales.

April 11th. Electric railway equipment. (B.X. 4281.)*

Melbourne.—May 8th. P.M.G.'s Department. Standard resistances, condensers, &c. (B.X. 4274.)*

Aylesbury.—Electricity Department. Twelve months' supply of cable, ironwork, l.p. insulators, a.c. meters, poles, joint boxes, cut-outs, &c. (March 16th.)

Bath.—April 13th. Electricity Department. One 3,000-kVA, 6,600/11,500-V transformer. (See this issue.)

Belgium.—April 15th. Provincial Government authorities, Hasselt. 50 kilometres (about 30 miles) of h.p. transmission lines and h.p. equipment for five transformer cabins.

Biggleswade.—April 18th. Beds. E.C. Electric lighting installation at the school, cookery and manual instruction centres. County Surveyor, Shire Hall, Bedford.

Birmingham.—April 5th. Board of Guardians. X-ray plant, Selly Oak Union Hospital. Schedule and particulars from steward.

Blackpool.—April 5th. Electricity Supply Department. 6,600-V, 150-kVA, 3-phase transformers, and 6,600-V, 3-phase, sub-station switchgear.(March 23rd.)

Canada.—H.M.'s Trade Commissioner at Vancouver reports that a Canadian firm requires one 2,500/3,000-kVA turbo-alternator set, 2,500 V, 3-phase, 60-cycle, including condensers, air pumps, &c. (B.X. 4276.)*

Clutton.—April 23rd. Board of Guardians. Electric lighting installation, Institution. Mr. I. Hood, engineer, 40, Queen's Road, Clifton, Bristol. (Returnable deposit of £2 2s.)

Dundee.—Town Council. Electric lighting installation for the Harefield Road housing scheme. Particulars from Mr. George Baxter, director of housing, 91, Commercial Street.

Egypt.—Cairo.—April 12th. Ministry of the Interior. Diesel engine alternator set for Suez electric light station. (B.X. 4252.)*

May 17th. Two Diesel engine driven generating sets for Mansourah. (B.X. 4277.)*

Epsom.—April 17th. Electricity Department. Two 500-600-kW Diesel engine-driven alternators and accessories, e.h.p. and l.p. switchgear, one 500-kW rotary convertor, two sub-stations with transformers and switchgear, e.h.p. cable and laying, cooling tower, and fuel-oil storage tank. (See this issue.)

Guildford.—April 12th. Town Council. Electric wiring of 80 flats and 24 houses, Aldershot Road. Mr. J. W. Hipwood, borough surveyor.

Hull.—April 19th. Electricity Department. 33-kV overhead transmission line and outdoor switchgear. (See this issue.)

Ilford.—April 4th. Electricity Department. Paper-insulated cables. (March 23rd.)

London.—Paddington.—April 12th. Great Western Railway. Electric wires and cables, telegraph ironwork, electric lamps. (March 23rd.)

Manchester.—April 4th. Electricity Committee. Electric radiators. (March 16th.)

April 12th. Central Purchasing Committee. Incandescent lamps for 12 months. (March 23rd.)

Middlesbrough. — April 11th. Electricity Department. Twelve months' supply of cables and meters. (See this issue.)

Newport.—April 5th. Isle of Wight C.C. Installation of central heating and electric lighting, County Hall. Mr. S. R. Cocks, county surveyor, 4, St. Thomas' Street, Ryde.

Perth.—March 31st. City Council. Electric lighting installation for erection of 36 houses, Crieff Road, Hillyhead. (Deposit £1.) Mr. T. Maclaren, borough engineer, City Chambers, 16, Tay Street.

Radcliffe.—Electric lighting installation, St. Paul's Wesleyan Church. Particulars from Mr. A. Rothwell, 39, Davenport Avenue, Radcliffe.

Salford.—April 2nd. Tramways Committee. Electric lamps, steel tires, axles, gears. General manager, Corporation Tramways, 32, Blackfriars Street.

South Africa.—Johannesburg.—April 24th. Town Council. Two 10,000-kW turbo-generators, with condensers. (B.X. 4266.)*

April 26th. A.c. and d.c. house-service meters. (B.X. 4262.)*

May 16th. Switchgear and transformers. (B.X. 4284.)*

May 10th. South African Railways and Harbours. One electric passenger lift with dual control. (A.X. 6083.)*

May 18th. 6,600-V a.c. and 210-V d.c. switchgear. (B.X. 4294.)*

Stoke-on-Trent.—May 9th. Electricity Department. One 12,500-kW turbo-alternator and condensing plant. (March 23rd.)

Uruguay.—Montevideo.—May 3rd. State Electricity Works. One 75-kW Diesel-engine generating set, with accessories and spares. (B.X. 4270.)*

May 21st. H. and l.p. armoured cables. (B.X. 4301.)*

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Australia.—Melbourne.—Commonwealth P.M.G.

Automatic telephones, &c. (£3,979).—Automatic Telephones, Ltd.

Telephones and dials (£2,434).—Siemens (Aust.) Pty., Ltd.

Accumulator batteries and plates (£656).—E. H. Sharpe.
Jumper wire (£3,333).—W. T. Henley's Telegraph Works Co., Ltd.
Telephonists' telephones, &c.—(£848), Phœnix Telegraph and Electrical Works, Ltd.; (£371), Siemens (Aust.) Pty.
Ringing motor generator.—(£1,485), Newton Bros. (Derby), Ltd.; (£247), Crompton & Co.
Insulated wire (£19,205).—Aust. General Electric Co., Ltd.
State Electricity Commission of Victoria.
Varnished cambric cable (£1,749).—Metropolitan-Vickers Electrical Co., Ltd.
Carbon, vacuum and gasfilled lamps.—(£668), Edison Swan Electric Co., Ltd.; (£668), British General Electric Co., Ltd. —*Tenders.*

Belgium.—ANTWERP.—Scheldt Intercommunal Electricity Co. Accepted:—
Two 40,000-kVA turbo-alternators.—Ateliers de Constructions Electriques de Charleroi.

Croydon.—Electricity Committee. Accepted:—
Erection of two wooden cooling towers (£5,509).—Film Cooling Towers, Ltd.
Recommended:—
Sub-station switchgear (£1,248).—A. Reyrolle & Co., Ltd.
Two 1,000-kVA Scott-connected transformers (£1,170); two 500-kVA, £789; and one 250-kVA, £194.—British Electric Transformer Co., Ltd.
E.h.p. switchgear, two split conductor feeder switches (£2,216).—Metropolitan-Vickers Electrical Co., Ltd.
Two 2,250-kVA transformers for bulk supply to Beckenham (£1,696).—British Electric Transformer Co.
Switchgear for bulk supply to Beckenham (£1,399).—Metropolitan-Vickers Electrical Co., Ltd.
Supply and laying two main feeders between Croydon and the Beckenham electricity works (£15,259 for 6,000-V, or, alternatively, £16,790 for 11,000-V).—Callender's Cable & Construction Co. (voltage to be decided by Central Electricity Board and the Electricity Commissioners).

Godalming.—Town Council. Accepted:—
Dynamo and switchboard for the Borough Road waterworks (£233).—F. A. Greene & Co., Ltd.

Government Contracts.—The following contracts were placed by various Government departments during February:—

ADMIRALTY, CIVIL ENGINEER-IN-CHIEF'S DEPARTMENT.

Stoneware ducts.—Albion Clay Co., Ltd.

ADMIRALTY, CONTRACT AND PURCHASE DEPARTMENT.

Motor alternator.—Metropolitan-Vickers Electrical Co., Ltd.
Bells, &c.—D. H. Bonnella & Son, Ltd.; Hawkers, Ltd.; A. Graham & Co., Ltd.; Engineering & Lighting Equipment Co., Ltd.; McGeoch & Co., Ltd.; Bonnella Bros., Ltd.
Cables.—British Insulated Cables, Ltd.; Connollys (Blackley), Ltd.; Enfield Cable Works, Ltd.; General Electric Co., Ltd.; W. T. Glover & Co., Ltd.; Greenwich Cable Works, Ltd.; Hackbridge Cable Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; Hooper's Telegraph and India Rubber Works, Ltd.; India Rubber, Gutta Percha and Telegraph Works Co., Ltd.; Johnson & Phillips, Ltd.; Siemens Bros. & Co., Ltd.; Standard Telephones & Cables, Ltd.
Cells.—Fuller Accumulator Co. (1926), Ltd.; Edison Swan Electric Co., Ltd.; D.P. Battery Co., Ltd.; Hart Accumulator Co., Ltd.; Chloride Electrical Storage Co., Ltd.
W/T condensers.—British Insulated Cables, Ltd.
Motor convertor.—Brush Electrical Engineering Co., Ltd.
Electric overhead crane.—Cowans, Sheldon & Co., Ltd.
Ventilating fans.—Veritys, Ltd.; W. H. Allen, Sons and Co., Ltd.
Motor generator sets.—Crompton-Parkinson, Ltd.
Electric light installations.—Read & Partners, Ltd.
Lampholders.—Revo Electric Co., Ltd.
Electric lamps.—General Electric Co., Ltd.; Siemens Electric Lamps & Supplies, Ltd.
Lamps and lanterns.—T. G. Blood; Bulpitt & Sons, Ltd.; Gabriel & Co.; E. Griffiths & Sons, Ltd.; Player and Mitchell.
Switches, &c.—Dorman & Smith, Ltd.; Edison Swan Electric Co., Ltd.; Gabriel & Co.; W. McGeoch & Co., Ltd.; Player & Mitchell; Small Electric Motors, Ltd.; and Hawkers, Ltd.
Ebonite trunking.—Chloride Electrical Storage Co., Ltd.
W/T valve holders.—H. W. Sullivan, Ltd.
W/T valves.—Mullard Radio Valve Co., Ltd.; General Electric Co., Ltd.; Edison Swan Electric Co., Ltd.
Aerial and earth wire.—British Insulated Cables, Ltd.; Connollys (Blackley), Ltd.; F. Smith & Co.
Copper wire.—Ward & Goldstone, Ltd.; Concordia Electric Wire Co., Ltd.; Kent Bros'. Electric Wire Co. and E. H. Phillips, Ltd.; Connollys (Blackley), Ltd.; Scott Insulated Wire Co., Ltd.

WAR OFFICE.

Boiler plants and accessories.—Yarrow & Co., Ltd.; International Combustion, Ltd.
Electric cable.—Callender's Cable & Construction Co., Ltd.; British Insulated Cables, Ltd.
Automatic telephone system.—Reliance Telephone Co., Ltd.
Wireless telegraph sets.—Plessey Co., Ltd.; Fellows Mfg. Co., Ltd.
Electric lighting installation (Fort Widney, Portsmouth).—Burch & Vertue.

AIR MINISTRY.

Internal wiring (Sealand).—W. J. Furze & Co., Ltd.
Stand-by generating set (Sealand).—Parsons Oil Engine Co., Ltd.
Magneto spares.—British Thomson-Houston Co., Ltd.

POST OFFICE.

Telephone apparatus.—Automatic Telephone Mfg. Co., Ltd.; British Insulated Cables, Ltd.; International Electric Co., Ltd.; Standard Telephones & Cables, Ltd.; Telephone Mfg. Co., Ltd.; T. Watson.
Protective and miscellaneous apparatus.—A. C. Cossor, Ltd.; Phœnix Telephone and Electric Works, Ltd.; Power Equipment Co., Ltd.; E. Turner.
Cable bearers.—Bullers, Ltd.
Terminal blocks.—T. De la Rue & Co., Ltd.
Battery boxes.—Siemens Bros. & Co., Ltd.
Cable.—British Insulated Cables, Ltd.; Enfield Cable Works, Ltd.; General Electric Co., Ltd.; W. T. Glover and Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; Hackbridge Cable Co., Ltd.; Pirelli-General Cables, Ltd.; Standard Telephones & Cables, Ltd.
Joint box castings.—United Steel Co.'s, Ltd. (Thos. Butlin and Co.).
Loading coils.—Siemens Bros. & Co., Ltd.; General Electric Co., Ltd.
Compound.—Dussek Bros. & Co., Ltd.
Telephone cords.—British Insulated Cables, Ltd.
Earthenware ducts.—Albion Clay Co., Ltd.; Donington Sanitary Pipe & Fire Brick Co., Ltd.; Doulton & Co., Ltd.; G. Jennings; H. R. Mansfield, Ltd.; Oates and Green, Ltd.; Standard Brick & Terra Cotta Co., Ltd.; Stanley Bros., Ltd.; Sutton & Co. (Overseal), Ltd.; Sykes & Son.
Fibre ducts.—Key Engineering Co., Ltd.
Manufacture, supply, drawing-in, and jointing cable.—Bermondsey-New Cross Junction and New Cross-Lee Green Junction.—Callender's Cable & Construction Co., Ltd. Mechanical tandem: Beckenham Junction.—W. T. Henley's Telegraph Works Co., Ltd. G.P.O. (S)—Ilford Junction.—Siemens Bros. & Co., Ltd.
Switchgear: Mount Pleasant Sub-station.—British Thomson-Houston Co., Ltd.
Telephone exchange equipment.—Hatch End; Margate: General Electric Co., Ltd. Ardwick: Siemens Bros. and Co., Ltd. Sub-contractors: English Electric Co., Ltd., for charging machines; Crompton-Parkinson, Ltd., for ringing machines; Chloride E.S. Co., Ltd., for batteries. Hornchurch: Standard Telephones and Cables, Ltd. Sub-contractors: Crompton-Parkinson, Ltd., for charging machines; Pritchett & Gold and E.P.S. Co., Ltd., for batteries. Collyhurst (Manchester): Standard Telephones & Cables, Ltd. Sub-contractors: Electric Construction Co., Ltd., for charging machines; Crompton-Parkinson, Ltd., for ringing machines; Chloride E.S. Co., Ltd., for batteries. Pearson, Dorman Long, Ltd. (Snowdon Colliery, Kent): Standard Telephones & Cables, Ltd. Sub-contractors: Automatic Telephone Mfg. Co., Ltd., for ringing machines. Kingston; Sydenham: Standard Telephones & Cables, Ltd. Valentine (Ilford Relief): Ericsson Telephones, Ltd. Sub-contractors: Crompton-Parkinson, Ltd., for charging machines; Walter Jones & Co., for ringing machines; D.P. Battery Co., Ltd., for batteries. Northwich; Synthetic Ammonia & Nitrates, Ltd. (Norton): Automatic Telephone Mfg. Co., Ltd. St. Helens Corporation; Southport Corporation; Halifax Corporation: Relay Automatic Telephone Co., Ltd.

CROWN AGENTS FOR THE COLONIES.

Alternators.—Mirrlees, Bickerton & Day, Ltd.
Cables.—Callender's Cable & Construction Co., Ltd.; W. T. Glover & Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; Hooper's Telegraph & India Rubber Works, Ltd.; Pirelli-General Cable Works, Ltd.
Generating plant.—Blackstone & Co., Ltd.; Belliss and Morcom, Ltd.; J. Gordon & Co., Ltd.
Generating sets.—Arrol-Johnston & Aster Engineering Co., Ltd.
Lux cells.—Chloride Electrical Storage Co., Ltd.
Overhead line materials.—Bullers, Ltd.
Relays.—Siemens & General Electric Railway Signal Co., Ltd.
Telephone materials.—Standard Telephones & Cables, Ltd.; Ericsson Telephones, Ltd.; General Electric Co., Ltd.
Train lighting equipment.—J. Stone & Co., Ltd.
Wet cells.—Le Carbone.

H.M. Office of Works.

Engine-generator set, &c.: Weeting Hall, Brandon.—Bull Motors, Ltd.

Wiring Ministry of Pensions Hospital, Orpington.—T. Clarke & Co., Ltd.

Hornsey.—Electricity Committee. Recommended:—

Repairs to coal bunkers (£101).—Fraser & Fraser.

Troughs and bridges.—Doulton & Co., Ltd.

Cables for 12 months.—Standard Telephones & Cables, Ltd., and Pirelli-General Cable Works, Ltd.

Inverness.—Town Council. Accepted:—

Electric lighting of the Bught House (£174).—H. Munro.

Irish Free State.—Dublin.—Department of Posts and Telegraphs.

Battery boxes.—J. O'Keefe & Co.

Cable.—W. F. Dennis & Co.; F. Routledge; Enfield Cable Works, Ltd.; J. L. Lake (Société Industrielle des Téléphones).

Cells.—General Electric Co., Ltd.

Lead strip.—Mining Co. of Ireland.

Electric torches.—Edison Swan Electric Co., Ltd.

H.d. copper wire.—F. Espir.

Zinc rods.—General Electric Co., Ltd.

Lamp Contracts.—The General Electric Co., Ltd., has received contracts for twelve months' supply of Osram lamps from the London, Midland and Scottish Railway, Belfast, and from the Admiralty for 53,200 Admiralty pattern carbon filament lamps, and for 23,970 night sight and telephone exchange lamps.

London.—Lloyd's New Building.

Electric clocks.—Synchronome Co., Ltd.

Chelsea.—Borough Council. Accepted:—

Additions to the electric lighting installations at two swimming baths (£139).—Rawlings Bros.

Battersea.—Electricity Department. Recommended:—

Annual contracts:—

Cables.—Callender's Cable & Construction Co., Ltd.

Electricity meters.—Chamberlain & Hookham, Ltd.; Ferranti, Ltd.

Bitumen.—Dussek Bitumen, Ltd.

Stepney.—Electricity Supply Committee. Recommended:—

20 feeder and 100 disconnecting boxes (£275).—W. Lucy and Co., Ltd.

Coal storage pits for Limehouse generating station (£15,600).—Wm. Simms.

Portland.—Urban District Council Water Committee. Accepted:—

Booster plant.—Worthington, Simpson & Co., Ltd.

Shipley.—Electricity Committee. Recommended:—

1,000-kW rotary convertor (revised tender).—English Electric Co., Ltd.

South Africa.—Cape Town.—Electricity Committee. Recommended:—

Automatic control gear (£343).—A. Reyrolle & Co., Ltd.

150 300-amp. unbreakable-type fuses (£300); 50 pairs contact terminals (£39).—Whipp & Bourne, Ltd.

Seven 500-kVA transformers (£3,006); seven 300-kVA transformers (£2,188); and fifteen 150-kVA transformers (£3,332) (all Ferranti).—A. Vaux, Ltd.

Five 250-kVA Hackbridge transformers (£952).—H. Davies & Co., Ltd.

Switchgear (£191).—A. Reyrolle & Co., Ltd.

18 surface disconnecting boxes (£919).—British Insulated Cables (S.A.), Ltd.

South Shields.—Electricity Committee. Accepted:—

Spares for 3,000-kW turbo alternator (£200).—Metropolitan-Vickers Electrical Co., Ltd.

Reconstructing air filter (£123).—Heenan & Froude, Ltd.

Repairing and overhauling battery (£885).—Tudor Accumulator Co.

Stoke-on-Trent.—Stores Committee. Accepted:—

Electric lamps.—Robinson & Hands; Blackburn, Starling and Co.; Welsbach Light Co., Ltd.; J. V. Brittain and Co., Ltd.; Barnett & Soans.

Electricity Committee. Accepted:—

Repairs to two cooling towers (£149).—Davenport Engineering Co., Ltd.

Swansea.—Electricity Committee. Accepted:—

Apparatus for recording the weight of coal (£140).—Samuel Dennison & Son, Ltd.

Wrexham.—Rural Council. Accepted:—

Wiring 100 houses for electric light: Plas Acton, Llay houses, £280; Gresford houses, £135; Rossett houses, £54.—Leslie Holmes.

Gwersyllt houses, £100; Rhostyllen houses, £99.—Jones and Williams.

Rossett houses, £107.—B. Evans.

Forthcoming Events.

Institution of Welding Engineers.—Friday, March 30th. Caxton Hall, S.W.1. 7.30 p.m. "Bronze Welding." Mr. W. Steele.

Junior Institution of Engineers.—Friday, March 30th. 39, Victoria Street, S.W. 7.30 p.m. "Locomotive Maintenance." Mr. C. F. Adams.

Royal Institution of Great Britain.—Friday, March 30th. 21, Albemarle Street, W. 9 p.m. "Radioactive Atoms and their Structure." Sir Ernest Rutherford, F.R.S.

Saturday, March 31st. 3 p.m. "The Transformation of Matter." Sir Ernest Rutherford, F.R.S.

Association of Supervising Electrical Engineers.—Tuesday, April 3rd. Junior Institution of Engineers, 39, Victoria Street, S.W. 7.15 p.m. "Spain." Mr. F. Gill.

Institution of Railway Signal Engineers.—Wednesday, April 4th. Institution of Electrical Engineers, Victoria Embankment, W.C. 6 p.m. "A Short Account of the Siemens & Halske Lock and Block System." Mr. T. S. Iascelles.

Institute of Wireless Technology.—Wednesday, April 4th. Engineers' Club, W. 7 p.m. "The Response of H.F. Circuits to Steady and Transient Modulation." Mr. W. B. Medlam.

Institution of Electrical Engineers (Wireless Section).—Wednesday, April 4th. Institution, London, W.C.2. "The Study of Signal Fading." Prof. E. V. Appleton, F.R.S.

(Scottish Centre).—Tuesday, April 3rd. Royal Technical College, Glasgow. 7.30 p.m. "Higher Steam Pressures and their application to the Steam Turbine." Messrs. A. H. Law and J. P. Chittenden.

(North-Midland Centre).—Tuesday, April 3rd. Hotel Metropole, Leeds. 7 p.m. Annual general meeting.

(Tees-Side Sub-Centre).—Wednesday, April 4th. Cleveland Technical Institute, Middlesbrough. 7 p.m. "Modern Electric Wiring, particularly as applied to Small Houses." Mr. D. S. Munro.

(North-Eastern Students' Section).—Friday, March 30th. Lighting Service Bureau, Dial House, Northumberland Street, Newcastle-on-Tyne. 7.15 p.m. Annual general meeting.

(North-Western Centre).—Tuesday, April 3rd. Engineers' Club, Manchester. 7 p.m. Annual general meeting. "Some Practical Considerations in the Design of Automatic Equipments for Heavy Traction Sub-Stations." Mr. H. B. Poynder.

(Western Centre).—Wednesday, April 4th. Guildhall, Plymouth. 6 p.m. "The Applications of Electricity in Warships." Mr. W. McClelland.

The "Electrical Review" Service Department.

Inquiries must be accompanied by a stamped addressed envelope.

We should be glad to learn the names and addresses of makers of the following:—

Rovur vacuum cleaners.

Ohio vacuum cleaner.

Notes.

Brush Students' Engineering Society.

The fifth annual dinner of this Society was held at Loughborough, on Friday last. Mr. W. Johnstone, managing director, president of the Society, was in the chair. In proposing the toast of "The Society," Mr. A. T. Brotherton (vice-president) congratulated the members on the progress they had made, the quality of the papers read, and the very good discussions that followed. He remarked on the fact that during their term at the Brush Co. the students had it in their own hands as to whether they laid a sound foundation or not for their future careers. During the evening musical items were rendered by Messrs. Cutter, Muir, and Hasty, and Mr. A. G. Deverill gave some excellent imitations of the cross-talk comedians, Messrs. Morgan and Max.

Regulations for Mines

The 1927 edition of the annual volume of "Regulations and Orders relating to Mines under the Coal Mines Act, 1911," has been published by H.M. Stationery Office. The book contains all the Orders and Regulations which were in force on January 1st, 1928, including the General Regulations and Order recently made with reference to the use of internal relighter safety lamps. In this edition substantial changes have been made in the arrangement of the matter, which it is hoped, in conjunction with the general index which has been revised, will enhance the utility of the volume as a book of reference. The book is published at 1s. net (by post 1s. 3d.).

E.P.E.A. Dinner.

The eighth annual dinner of the London Western Section of the Electrical Power Engineers' Association was held at St. Ermins Hotel, Westminster, on March 24th, when about 120 members and guests were seated, and Mr. E. G. Hildebrand, chairman of the section, was in the chair.

After the loyal toast, Mr. B. J. Samels, J.P., chairman of the District Joint Board for the No. 10 area, proposed "The Association." He outlined the developments which had taken place in the London area during the last few years, and, in referring to the establishment of super power stations, suggested that perhaps too much attention was being given to generation and not enough to distribution. One good result of the national scheme would be co-ordination. The E.P.E.A. was working for the betterment of the industry, and that in turn reflected on the staff.

In reply, Mr. T. D. Martin, vice-president of the Association, outlined the development of that body up to its most recent move, the formation of the National Technical Groups. These would form the link between the user and the manufacturer, which would result in the exchange of much information. A schedule had been established for the tramway members, and the Association was now endeavouring to obtain superannuation for its company members. Negotiations with the Central Electricity Board in connection with the closing down of generating stations under the national scheme had resulted in some useful promises from Sir Andrew Duncan.

Mr. E. Rendell Ingram, vice-chairman of the London Eastern Section, proposed the "National Technical Groups." These were formed to create co-operation between the manufacturer and the supply industry, and their establishment was a proof that the Association was out to do some real good for the industry as a whole.

In reply, Mr. W. J. Oswald, a past-president, pointed out that the whole purpose and functions of the Technical Groups were to pool the knowledge of the supply and the manufacturing sides of the industry with the object of improving the machinery. The first idea of co-operation between the employer and employé had resulted in the best joint board in the country; the idea was now carried further, and would, he thought, overcome many of the problems which confronted both the manufacturer and user. The mains and transmission group which had been established in London had met with success, and a sub-committee had been formed to deal with the generation side. One object behind the move was to encourage the younger men to express the uncertainties in their minds, and in this connection he believed that the scheme would prove to be complementary to the great engineering institutions.

"Our Section and Our Chairman" was proposed by Mr. E. W. Greenway, and Mr. Hildebrand suitably replied.

Fatalities.

A workman employed in Dewshill Colliery, Salsburgh, received a fatal electric shock on March 19th. It is believed that the hole-boring machine which he was manipulating was defective.

A third death has taken place as the result of the mishap at Dreghorn (Ayrshire) on February 29th, when a wireless pole came into contact with overhead power mains.

A 13-years-old boy received a fatal electric shock on the Southern Railway at Beckenham on March 25th. He climbed through barbed wire protecting the track, and in crossing the line came in contact with the "live" rail.

Co-ordination of International Technical Meetings.

International congresses and meetings to discuss technical subjects are on the increase, and so also are the possibilities of the overlapping of effort. On the occasion of the meeting in Italy in September, 1927, of the International Electrotechnical Commission, the opportunity was taken to convene an unofficial meeting of representatives of several international organisations which happened to be holding meetings in Italy about that time. Signor Guido Semenza, the then president of the I.E.C., was in the chair, and seven international technical organisations were represented. The idea of contact with each other through some central committee was well received, and the I.E.C. was invited to act as convener for such an unofficial committee. In January of this year the first meeting of the unofficial "Comité d'Entente" was held in London at the offices of the I.E.C., when representatives were present from the International Illumination Commission, World Power Conference, International Consultative Committee on Long Distance Telephony, International Union of Producers and Distributors of Electrical Energy, International Standards Association (in process of formation), and the International Electrotechnical Commission. Prof. Clarence Feldmann, the new president of the I.E.C., was in the chair, and an exchange of information took place regarding dates of future meetings and, in one or two cases, about the preliminary programmes. It was felt that if information of such a character could be exchanged, say, once a year, it would be bound gradually to lead to most helpful co-operation and be of advantage to the delegates attending the many international meetings, besides probably enhancing the value and usefulness of the meetings themselves. Co-operation between international organisations by joint international committees, as well as by observers, was also touched upon. Finally, it was decided to keep the unofficial committee in being with the I.E.C. as convener and to call another meeting a year hence, by which time the various organisations represented would have had time to give their official decision regarding the permanent establishment of such a committee as a kind of clearing house through which information may be exchanged and administrative matters discussed in a free and friendly manner.

A New Aerial Cableway.

An aerial cableway, Gerschnialp-Trubsee, near Angelberg, Switzerland, was officially opened on December 17th, 1927. The line is designed to carry both passenger and freight traffic by means of a closed car suspended from a cable between stations 2,235 metres apart and having a difference in elevation of 531.5 metres. A more elaborate cableway for commercial purposes and passenger traffic was erected about 20 years ago on the Wetterhorn in the Bernese Oberland, but its operation was discontinued several years ago because of the lack of passengers. The new line, near the summer and winter resort of Engelberg, having an altitude of 1,020 metres, is designed to increase the facilities of this resort for winter sports, as the town's elevation is not quite high enough to assure its having snow and ice throughout a mild winter. The upper heights of the mountains, with an abundance of snow during the winter months for skiing and other sports, are thus made very accessible to the hotels at Engelberg. The cableway consists of two parallel lines of suspension cables, each of which carries a car, one ascending as the other descends. A towing line is attached to the forward end of each car and connects with the power station at the upper terminus. The power plant consists of an a.c. motor, with a d.c. motor in reserve in case of the failure of the chief power unit. Both motors are equipped with electromagnetic brakes which are automatically applied if the maximum speed of operation is exceeded, if the hawser should break, or in case the end station is overrun by the car. The brakes also can be applied by hand. Each car can accommodate 16 passengers and the conductor, and carry 150 kg. of baggage. The operating speed is approximately nine miles per hour, giving a maximum traffic of 65 passengers per hour in each direction, based on four trips per hour.—*Commerce Reports.*

The Birth of Elements.

The world is not doomed eventually to die through lack of heat and energy, for elements are born unceasingly in stars and nebulæ. This new theory of the universe was advanced by Dr. Robert Millikan, of California Institute of Technology, speaking before his associates at Pasadena, U.S.A., recently. He asked them to await further experiments before accepting his theory as fully proved, but said that his recent experiments with cosmic rays left no doubt in his mind that the process of creation was now going on in the heavens and that our earth was not, as had been long believed, a disintegrating planet. His investigations of cosmic rays have been conducted at high mountain lakes of California and Bolivia. The rays have been studied with the aid of self-recording electroscopes carried by balloons nearly up to the full extent of the earth's atmosphere. Dr. Millikan termed his measurements "announcements of the birth of elements" which were being formed continually from electrons. Explaining his theory in greater detail, he is reported by the *Daily Mail* to have said that all elements had a structure, which showed that they were exact multiples of hydrogen, and under the process of radio activity heavier atoms were disintegrating into lighter ones. It should therefore be expected that somewhere in the universe a building-up process was going on to replace the destructive force of radio activity. He believed that his present discoveries were the first evidence of such a creative process—that everywhere, in the stars, in nebulæ, and in the depths of space, creation was proceeding.

Electricity v. Gas.

During the recent hearing of evidence before the House of Commons Committee upon the South Metropolitan Gas Company's Bill (reported in the *Gas World*) the dispute between the company and the Woolwich Borough Council was dealt with. The Council desired that its estate at Eltham should be lighted electrically, and refused to allow the company to supply gas for the purpose, although it was willing to permit the supply of gas for cooking and heating. The company, considering that this would be unremunerative, applied for permission to refuse to supply. Later, a clause providing for this was inserted in the Bill, but was then abandoned. The company had received requests for a supply of gas for cooking, but as few of the houses were within the statutory distance of the mains, no action was taken. In the meantime

the Ministry of Health obtained control of the estate, and said that unless means for gas lighting were included in new houses the portion of the cost of the houses involved in the electrical scheme would not be allowed for the purpose of the subsidy. In spite of that the Council persisted in its attitude. About 50 of the 2,000 houses were within statutory distance of the gas main. Counsel for the Gas Co. said that dissatisfaction had arisen regarding the electric cooking apparatus. The Council had refrained from taking over the streets because when it did so and they were dedicated to public use, the Gas Co. could proceed to lay mains and give a supply for all purposes. Counsel for the opponents disagreed with that, stating that the Council had taken over some streets and was ready to take over others when they were suitable. In the case of Newport (Mon.) in 1925 the Corporation had been precluded from inserting a restrictive clause upon the use of gas in its Bill. As it was stated that the Borough Council would probably have taken over the whole of the roads in six months, a member of the Committee pointed out that the company would then have all the powers for which it was asking. The chairman of the Committee said that it was felt that, while the Council's action was unwise, it could not be compelled to give consent to the supply of gas while the roads remained undedicated to public use, and its permission must therefore be sought. The Bill was ordered to be reported for third reading subject to the insertion of an agreed clause giving effect to the Committee's decision.

Appointments Vacant.

Electrotechnical assistant (£416) for the Manchester Corporation Electricity Department. Charge engineer (£312) for the Tilbury U.D.C. Electricity Department. Shift engineer (63s.) for the Institution for Mental Defectives, Whalley, near Blackburn. Lady for the Electricity Show of the King's Lynn Corporation Electricity Department. (See our advertisement pages to-day.)

Electricity Charges.

In the House of Commons, on March 26th, Mr. W. Baker asked the Minister of Transport whether he would state the number of applications he had received since January, 1927, from local authorities and aggrieved consumers asking for the revision of the prices charged by electricity undertakers; whether any application from the Wandsworth Borough Council was among them; and whether he would state the number of such cases in which he had exercised his statutory powers.

Colonel Ashley said that there had been seven such cases. He had not yet received a formal application from the Wandsworth Borough Council, which had, however, intimated its intention of supporting an application that had been made by certain consumers. In two cases he had made Orders; in two cases the applications were still under consideration, and the remaining three cases were in abeyance pending local negotiations with a view to settlement.

Birmingham Electric Club.

The annual dinner of the Birmingham Electric Club was held on Friday last week. There was a large and representative attendance, and Mr. T. H. Varcoe (president) occupied the chair.

The toast of "The Electricity Industry" was submitted by Mr. S. T. Allen, chief engineer of the West Midlands Joint Electricity Authority, who pointed out that the industry was rapidly becoming one of the most important in the country. He emphasised the importance of increasing the number of units sold per head of the population, and urged the need for a comprehensive commercial policy. Referring to the Central England Scheme, he said they should support the Central Board in its difficult task, and confine their criticism to constructive proposals. Major-General Sir Philip Nash, in reply, said that considerable progress had been made on the manufacturing side in recent years, and that had been achieved by serious concentration, research, and development. There was an immense future before the industry in this country.

The Lord Mayor (Ald. A. H. James), in acknowledging the toast of "The City of Birmingham," which was proposed by Mr. Gilbert Vyle (Averys, Ltd.), said the electrical industry had made valuable contributions to the amenities of the community, both from the industrial and the domestic points of view.

Mr. R. A. Chattock, city electrical engineer, proposing the toast of "The Electric Club," pointed out that the Act of 1926 had set the public thinking electrically. That was a factor which would play an important part in future development. The President, replying, mentioned that the first Electric Club in the country was formed in Birmingham.

The toast of "The Visitors" was proposed by Mr. J. H. Asdell, and Mr. A. C. Baker, president of the Bristol Electric Club, and Mr. Bernard D. F. Docker responded.

Electricity Supply in Great Britain.

On Tuesday last week Col. W. Ashley, Minister of Transport, gave an address to the members of the Constitutional Club on electricity supply and distribution, Mr. P. J. Hannon, M.P., presiding. He claimed that electricity could be produced in this country as cheaply as in any other, and urged electrical distributing authorities to develop that side of the industry.

Explosion Inquiry.

An inquiry was held at Dunfermline (Fife) on March 22nd and 23rd relative to an explosion at Glencraig Colliery in January, as a result of which two men sustained fatal injuries. Evidence was taken before Sheriff Umpherston and a jury. The deceased men and others who were injured were engaged in the Mynheer seam of the colliery when an ignition of gas occurred. Colliery officials and others who gave evidence expressed the view that the ignition was caused by a spark or flame from an electric coal cutter, in which several holes were discovered after the machine, which had been used at another colliery previously, had been brought to the surface and examined by experts. An official who had previously been manager at the colliery said, on examination of the coal-cutting machine after the explosion, three holes were found in the casing of the electrical part. These holes made the machine not flame-proof in the event of internal sparking. He was satisfied that the machine was the cause of the explosion. Sheriff Umpherston suggested to the jury that to their formal verdict they should add an expression of opinion that every coal cutter should be maintained in flame-proof condition, irrespective of whether it was used in places where gas was anticipated or not. The jury acted on the Sheriff's suggestion, and made the further recommendation that one official or person in authority should be held responsible for the condition of coal-cutting machines before they were sent down the mines.

E.A.W. Activities.

On March 14th some members of the Electrical Association for Women, together with a party of senior students from the Regent Street Polytechnic and a number of Dutch lady electrical engineers, accepted the invitation of the British Thomson-Houston Co., Ltd., to a private view of "The House of the Future" at the *Daily Mail* Ideal Home Exhibition. Following this visit the party inspected a large display of domestic electrical appliances on the stand of the Hotpoint Electrical Appliances Co., and afterwards adjourned, for a discussion, to the grill room café, where refreshments were served.

On March 13th, Mr. A. P. Fleming gave an interesting lecture on "The Romance of Electricity" to the Manchester District Branch of the E.A.W. He traced the history of electricity from the very early days, and then showed the many applications of electricity to present requirements.

Institution Notes.

Institution of Electrical Engineers.

North-Western Centre Reunion.—It is proposed to arrange a reunion of the North-Western and the Mersey and North Wales (Liverpool) Centres during the week-end May 11th to 14th in the Lake District, at either Windermere or Grasmere. The arrangements include a dinner and local excursion, and members wishing to take part should intimate their intention at once to Mr. J. D. Peattie, Corporation Electricity Department, Dickinson Street, Manchester.

Informal Meeting.—At the meeting on March 19th, with Mr. R. A. Brockbank in the chair, Mr. W. A. Erlebach opened a discussion on "Registration of Engineers." He traced the development of registration of practitioners in various professions and trades in England and abroad, and said it was urged that registration would regulate the quality of engineering and ensure competence, but if registration was to be achieved it would have to include at first many of doubtful qualifications; subsequently the associate membership of one of the great institutions could be the standard. Registration of engineers had been taken up in New Zealand, the United States, Italy, and Norway, but no very important results had yet been indicated. The general effect, however, had been to give preference to registered engineers for State and municipal work. One great difficulty was the definition of an engineer. Several suggestions had been put forward, but a comprehensive and satisfactory description had not been found.

Western Centre.—It is announced that a summer meeting of this Centre will be held at Weston-super-Mare during the week-end, May 18th to 21st.

Junior Institution of Engineers.

On Friday, March 23rd, Mr. B. J. Axten gave a lecture on the subject of "High-Tension and Low-Tension Supply for Wireless Receivers from Electric Mains." He said that the need for "battery eliminators" arose from considerations of convenience and also of the demands for power made by the last stages of amplification in modern sets giving efficient sound reproduction A potential of 120 volts on the anode of a power valve was now generally used, and the potential went up even to 500 volts where greater sound volume was required. In such cases the current demand was more than dry batteries could economically produce. Accumulators were good, but required expert attention.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

Mr. P. F. ALLAN, who has been with the Macintosh Cable Co. since 1919, and has latterly been acting as special representative in connection with "super-tension" cable work, has been appointed works manager and engineer to the company at Liverpool, where its paper-insulated cable factory is situated, and where also the contract department is domiciled. The position of chief engineer, held by the late Mr. Charles Vernier, will not be refilled; such of his duties as related to Liverpool and the Contract Department will be merged into Mr. Allan's duties. Formerly he was associated with Messrs. Siemens Bros., and during the war he was lent to the Inspection Department, Woolwich, and the Aeronautical Inspection Department, by Messrs. Siemens.

Mr. H. W. Roberts (sales manager) presided at a dinner at which about forty of the Sales Department of the General Electric Co., Ltd., were present, held at the Boulogne Restaurant, W., on March 12th. The occasion marked the departure of Mr. R. F. RILEY and Mr. S. HACK, the former to take up an important post with the company at Johannesburg, and the latter to open a branch for the company at Plymouth. Mr. Roberts presented Mr. Riley with a silver tea and coffee service, and Mr. Hack with a canteen of cutlery, on behalf of their colleagues.

Douglas (Isle of Man) Town Council has increased salaries as follows:—Mr. S. ROBERTSON, tramway manager, from £490 to £500 per annum; Mr. BERTRAM KELLY, borough electrical engineer, from £550 to £600 per annum; Mr. P. BREGAZZI, mains superintendent, from £299 to £320 per annum; and Mr. R. M. CLAGUE, station superintendent, from £331 to £350 per annum.

Mr. A. R. WOOD, who for the last 9¼ years has been manager of the electric cooking and heating department of the Falkirk Iron Co., Ltd., has resigned that position on being appointed electrical manager of the new "Caledonia" Stove & Electrical Works of Messrs. Lane & Girvan, Ltd., Bonnybridge, near Glasgow, which will shortly be erected. Mr. Wood, who has had experience extending over 25 years in this class of business, will be responsible for the lay-out and equipping of the buildings, as well as for the manufacturing and sales organisation.

One of the oldest members of the Liverpool G.P.O. telephone staff, Miss GERTRUDE JOHNSON, is about to retire after having occupied the position of chief supervisor of the trunk system at the Liverpool G.P.O. for 32 years. Miss Johnson joined the National Telephone Company in 1882, and at that time there were only 430 subscribers. The telephone service was then closed down at six o'clock in the evening. A large number of presentations have been made to Miss Johnson by members of the G.P.O. staff.

Sir HUGO HIRST, Bt., is a member of the Mission appointed by Mr. Amery, Secretary for Dominion Affairs, to leave for Australia in August for the purpose of reporting upon possibilities of increasing our trade with, and settlement in, Australia, as announced in our "Business Notices" to-day.

Mr. C. E. FAIRBURN, M.A., has been appointed to succeed Lt.-Col. C. C. A. Hardie, D.S.O., as general manager of the English Electric Company's works at Stafford. He has been associated with the company since its formation, and for some time past has been general manager of the Preston works. He now holds the dual post of general manager of both works.

Mr. C. D. MACLURCAN, the president of the Wireless Institute of Australia, is at present on a visit to this country.

In the reference to the National Accumulator Co., Ltd., in our issue of March 16th, the name of Mr. CLAUDE JOHNSON (Johnson & Phillips, Ltd.), who is a director of the new company, was inadvertently omitted.

Lieut.-Colonel G. G. MALLINSON, T.D., has been appointed to the command of the Tynemouth Heavy Brigade, Royal Artillery (T.A.), in succession to Lieut.-Colonel A. P. Pyne. Colonel Mallinson is attached to the Newcastle branch of Messrs. Johnson & Phillips, Ltd., having succeeded Colonel Pyne, who is now in charge of the cable shops at the company's Charlton works.

The Hammersmith Borough Council has increased the salary of Mr. R. H. PATERSON, chief assistant electrical engineer, from £750 to £800 per annum.

Mr. GUY BURNEY'S residential address in future will be: 22, Holland Park Avenue, Kensington, London, W.

Obituary.—MR. H. C. HAWKINS.—We regret to record the death, which occurred on March 21st, after just over a fortnight's illness, of Mr. H. C. Hawkins, one of the directors of Messrs. L. G. Hawkins & Co., Ltd. Mr. Hawkins, who had made many friends in the electrical trade in all parts of the country, possessed a business enthusiasm and a personality which helped both the appliance and lighting section in general and his own company's business in particular. Before his separate business operations he had been connected with the Edison Swan Electric Co., the General Electric Co., and Messrs. Veritys. During the war he was with the Royal Engineers, and attained the rank of captain, and on leaving the Army he joined the company with which he was associated up to his death.

MR. R. J. S. INSELL.—The death occurred on March 25th, at Torquay, of Mr. Robert James Singer Insell, signal and telegraph engineer to the Great Western Railway, at the age of 61 years.

MR. L. LEE MURRAY.—We regret to learn that Mr. L. Lee Murray, M.C.E. (Melbourne), M.I.C.E., M.I.E.E., M.I.M.E., passed away on Tuesday morning, after a fortnight's illness, at the age of 63 years. Mr. Murray, in the course of his career, had filled important offices with Messrs. Siemens Bros., both at Stafford and in South Africa, played a prominent part in connection with the business of Messrs. Bruce Peebles and Co. some years ago, and was well known in this country and in Australian and other Colonial markets as an inspecting, purchasing, and consulting engineer. We shall refer more fully to his career in our next issue.

MR. T. R. SMITH.—We regret to learn from the *Yorkshire Post* that Mr. Thomas Robert Smith died from the effects of a fall on Monday last. Mr. Smith retired from the position of engineer and general manager of the Leicester electricity undertaking about three months ago. His portrait and some details of his career were published in our issue of January 13th last (p. 71).

MR. W. B. CROFT.—The death of Mr. W. B. Croft on Friday last, at the age of 76, removes one who, as teacher of mathematics and physics for 40 years at Winchester, exercised great influence in the promotion of the study of electrical science, and was one of the first to experiment with the Branly coherer in this country.

Will.—The late Mr. A. B. PESCATORE left English estate of the net value of £2,953.

Financial Section.

New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

Wareham Electricity Supply Co. (1928), Ltd.—Public company. Registered March 19th. Capital, £4,000 in £1 shares (2,000 6 per cent. preference and 2,000 ordinary). To acquire the business carried on by the Wareham Electric Supply Co., Ltd., to adopt an agreement with the said company and H. E. Burgess, and to carry on in Wareham and in the adjacent parishes of Arne and Wareham St. Martin, or elsewhere, the business of proprietors of an electric light undertaking, &c. Purchase consideration, £2,500, payable in cash. Minimum cash subscription, 2,500 shares. The first directors (to number not fewer than two or more than five) are:—J. M. C. Field, West Walls, Wareham, Dorset, electrical engineer (permanent); Rev. W. J. Coburn, Worth Matravers Vicarage, near Swanage. J. M. C. Field is managing director for 10 years, with a salary of £260 per annum. Qualification, £100. Remuneration of other directors, £25 per annum divided between them. Secretary: Edith M. Field. Registered office: Power Station, West Walls, Wareham.

British Quain Sunlight, Ltd.—Private company. Registered March 22nd. Capital, £12,500 in 2,500 founders' and 10,000 ordinary shares of £1 each. Objects: To acquire any patents or inventions relating to the manufacture, production, projection and display of artificial, real or natural sunlight, sun-heat, sun-rays, sunbeams, and sun-radiation in any form, and particularly to electrical apparatus, machinery, process, or other contrivances producing light and heat by radiation, &c. The first directors are:—J. M. Tabor (chairman and managing director), St. Peter's Road, St. Margarets-on-Thames; H. E. Tabor, 7, Lyndhurst Gardens, Church End, Finchley, N.; H. Sutton, fishcurer, Great Yarmouth; J. W. Stammers, Hillcrest, Oakwood Avenue, Purley, Surrey. Qualification: £100 shares. Secretary: J. W. Stammers. Registered office: 20 and 21, Lawrence Pountney Hill, Cannon Street, E.C.4.

Willesden and District Light Supply Co., Ltd.—Private company. Registered March 22nd. Capital, £500 in £1 shares. Objects: To carry on the business of electricians, mechanical, electrical and gas engineers, &c. The subscribers (each with one share) are: R. Brosen, 267, High Road, Willesden, N.W.10, engineer; W. G. Saville, 5-6, Clements Inn, Strand, W.C.2, law clerk. R. Brosen shall be permanent governing director so long as he holds one-fifth of the issued share capital. Qualification of directors, £100 shares. Registered office: 267, High Road, Willesden, N.W.10.

Société Rateau.—Particulars of this company were filed on March 12th, pursuant to Section 274 of the Companies (Consolidation) Act. The capital is 25,000,000 fr. in 50,000 shares of 500 fr. each. The company was incorporated in France on July 20th, 1923, to exploit in France and elsewhere the Rateau systems and processes for the accumulation of steam, and all systems capable of regularising the flux of steam; to manufacture machines and processes connected with mechanics or electricity, &c. The main office is at 40, Rue du Colisee Paris VIIIe. P. F. Reider, of 28, Russell Square, W.C.1, mechanical engineer and manager of the company's London branch, is authorised to accept service of process and notices on behalf of the company. The directors are A. Rateau, P. Chaleil, F. Marchoux, R. J. J. Margot, V. Marmer, and O. M. J. K. Homberg, all of Paris; V. Defays, of Forest-les-Bruxelles; and M. Sohm, of Bruay.

Official Returns of Electrical Companies.

Veritys, Ltd.—Particulars filed of £60,000 debentures (including £24,859 of debenture stock outstanding under prior deed) authorised February 8th, and covered by trust deed dated February 20th, 1928 (supplemental to two deeds dated October 31st, 1908, and May 17th, 1909), charged on the company's property, present and future, including uncalled capital (but excluding freehold hereditaments specified in deed of October 31st, 1908), the amount of the present issue being £35,141. Trustees: Trustees Corporation, Ltd.

West Sussex Electrical Co., Ltd.—Particulars filed on March 13th of £1,000 debentures authorised January 14th, 1928, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £600.

Scott & Scott (Bournemouth), Ltd.—Memorandum of deposit on March 5th, 1928, charged on 91, Poole Road, Bournemouth, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., not exceeding £1,000.

Harris, Williams (Manufacturers), Ltd.—Debenture dated February 29th, 1928, to secure £1,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: H. S. Sutherland, "Chislehurst," Carmel Road, Darlington; and T. Hall, 37, Groat Market, Newcastle-upon-Tyne.

Nelson Electric Co., Ltd.—G. H. Robinson, of 95a, Chancery Lane, W.C.2, ceased to act as receiver or manager on March 13th, 1928.

Climax Vacuum Cleaner Co., Ltd.—H. L. Williams, of 147, Cannon Street, E.C., was appointed receiver and manager on March 15th, 1928, under powers contained in debenture dated October 21st, 1927.

Arclite, Ltd.—S. Howell of Regent House, Regent Street, W.1, ceased to act as receiver or manager on March 15th, 1928.

Allerton Electrical Supplies, Ltd.—Capital, £2,000 in £1 shares. Return dated December 31st, 1927. 1,500 shares taken up. £1,500 paid. Mortgages and charges, £1,400.

Racon Electrical Co., Ltd.—Capital, £100 in £1 shares. Return dated December 30th, 1927. All shares taken up. £100 paid. Mortgages and charges nil.

Radio Experts, Ltd.—Capital, £500 in £1 shares. Return dated December 30th, 1927. 200 shares taken up. £200 paid. Mortgages and charges nil.

Palermo Gas, Light and Power Co., Ltd.—Capital, £50,000 in 1s. shares. Return dated December 31st, 1927. 5,007 shares taken up. £250 7s. paid. Mortgages and charges nil.

Metallic Seamless Tube Co., Ltd.—Capital, £65,333 in 20,000 preference shares of 13s. 4d. each and 260,000 ordinary shares of 4s. each. Return dated December 23rd, 1927. 15,245 preference and 260,000 ordinary shares taken up. £36,163 paid on 15,245 preference and 130,000 ordinary shares. £26,000 considered as paid on 130,000 ordinary shares. Mortgages and charges nil.

Electric Cables, Ltd.—Capital, £2,000 in £1 shares. Return dated December 31st, 1927. 1,000 shares taken up. £1,000 paid. Mortgages and charges nil.

Wakelins Wireless Co., Ltd.—Capital, £2,500 in 1,250 preference and 1,250 ordinary shares of £1 each. Return dated December 19th, 1927. 135 ordinary shares taken up. £102 paid. £33 considered as paid. Mortgages and charges nil.

Liverpool Electric Cable Co., Ltd.—Capital, £75,000 in £1 shares. Return dated February 17th, 1928. All shares taken up. £32,833 paid. £42,167 considered as paid. Mortgages and charges £7,574 7s. 10d.

Wakelins Engineers, Ltd.—W. Reacher, C.A., of 46, Basinghall Street, E.C.2, ceased to act as receiver or manager on March 8th, 1928.

Electro-Therapeutic Supply Co., Ltd.—D. Lewis, C.A., of Kennan's House, Crown Court, Cheapside, E.C.2, was appointed receiver and manager by order of court dated February 21st, 1928.

Dynelex, Ltd.—W. S. Warren, of 8-9, Martin Lane, E.C.4, ceased to act as receiver or manager on December 3rd, 1927. (Notice filed March 10th, 1928.)

Oswestry Electric Lighting and Power Co., Ltd.—Issue on March 8th, 1928, of £700 debentures, part of a series already registered.

Cymbal, Ltd.—Capital, £200 in 2s. shares. Return dated December 31st, 1927. All shares taken up. £200 paid. Mortgages and charges nil.

Read & Morris, Ltd.—Capital, £2,000 in 1,200 shares of 1s. each and 1,940 shares of £1 each. Return dated December 31st, 1927. 1,200 1s. shares taken up. £30 paid. £30 considered as paid. Mortgages and charges nil.

L.P.S. Electrical Co., Ltd.—Capital, £5,000 in £1 shares. Return dated January 12th, 1928. All shares taken up. £5,000 paid. Mortgages and charges nil.

Bestolamps, Ltd.—Capital, £3,000 in 2,500 preference shares of £1 each and 10,000 ordinary shares of 1s. each. Return dated December 31st, 1927. 1,300 preference and 10,000 ordinary shares taken up. £500 paid on 500 preference shares. £1,300 considered as paid on 800 preference and 10,000 ordinary shares. Mortgages and charges, nil.

Regent Electrical Co., Ltd.—T. W. McEwen, of 65, Hopton Road, Streatham, S.W., was appointed receiver and manager on March 19th, 1928, under powers contained in debenture dated August 8th, 1927.

City Notes.

Automatic Telephone Manufacturing Co., Ltd.

The annual meeting was held on March 20th. Sir Alexander Roger (chairman) presided, and in presenting the report and accounts (*vide* our last issue, p. 529) said that it had been decided to place £40,000 to a special reserve which could be drawn upon, if necessary, for the development of business in new foreign territories. The dividend was maintained at 10 per cent. for the third successive year. The board considered it wise to follow a conservative policy in that respect; there was much work ahead, and it was necessary for the company to retain considerable balances in the business. The capital expenditure during the year was small, and there was no immediate prospect of any important capital outlay. The outstanding events of the year were the opening of the Mechanical Tandem Exchange and the Holborn Automatic Exchange, the equipment for which was made and installed exclusively by the company for the General Post Office. The Holborn exchange marked the introduction of Strowger equipment into London, and he claimed that it had successfully solved the problems in connection with providing automatic service for London's complex requirements. The second large automatic exchange (that at Bishopsgate) was put into service on March 3rd. The two exchanges were now providing services for nearly 20,000 subscribers. Other large exchanges which the company was constructing for London were: Monument, Metropolitan, National, Hendon, Hillside Park, Primrose Hill, and Amherst. They had also during the year carried out many large installations in the provinces, including Southport and Nottingham. There were now over 60 centres in this country equipped with Strowger automatic apparatus. Foreign business had been well maintained; thirteen exchanges had been completed and dispatched, including two for the Buenos Aires

system of the United River Plate Telephone Co. They anticipated a greatly accelerated demand for automatic intercommunication systems in business establishments, and to encourage it they had developed a range of small switchboards from 10 lines upwards. The telegraph and mine-signalling branches showed satisfactory results, and the manufacture of "Xcel" domestic appliances continued to expand. They had developed cookers suitable for hiring systems, and during the year the sales of cookers increased by 135 per cent. The company was now manufacturing an improved fire alarm system. Their relationship with their own employés had been on a consistently peaceful footing, but troubles in other spheres had their effects upon the business. National and local taxation was still oppressive. There was urgent need for a reduction of that burden, and for continued goodwill between employers and workers. The chairman concluded with a reference to the work of the Telephone Development Association.

International Automatic Telephone Co., Ltd.

Sir Alexander Roger also presided at this meeting on March 21st. His speech covered the same matters as were dealt with at the meeting of the Automatic Telephone Manufacturing Co., Ltd. He said that the patent rights of the Strowger system were being fully maintained by the company and its associated companies in various parts of the world, and the directors were of the opinion that the balance-sheet figure in respect of patent rights and goodwill was a conservative one. Sir Alexander also mentioned the appointment of Mr. John Lee, C.B.E., to the board.

British Insulated Cables, Ltd.

Mr. D. Sinclair (chairman) presided at the annual meeting last week, and in moving the adoption of the report and accounts (ELEC. REV., March 16th, p. 476) referred with regret to the death of Mr. James Taylor, the chairman of the company. He said that the transfer of £200,000 to reserve brought it up to £900,000, and the addition of the special reserve gave a total of £1,050,000. The increase in the provision for depreciation was necessitated by the growth of the factory. The company's subsidiary, the Midland Electric Corporation for Power Distribution, Ltd., continued to do well; it had maintained a dividend and bonus totalling 15 per cent., and the directors proposed to make an issue of bonus shares. The 5 per cent. debenture stock had been redeemed, and the parent company's guarantee was thus discharged. The Electric Supply Co. of Victoria, Ltd., had earned sufficient to pay an ordinary dividend of 10 per cent., but, in view of the fact that the question of the concessions had not been settled, the funds were being conserved. After careful examination and discussion, the "closer working" agreement with several other of the more important cable makers was put into force at the end of last June. Already a number of improvements and economies had resulted from collaboration in research, but some time would elapse before the full benefits of the arrangement were felt. The staffs of the various companies were working wholeheartedly in the common interest. The reorganisation of electricity supply under the Electricity (Supply) Act, 1926, involved the erection of a number of e.h.p. transmission lines. The company was well to the fore in that class of work, and had obtained the first order placed by the Central Electricity Board, for 132,000-V lines for the Central Scotland scheme. Altogether, at home and abroad, the company had in hand at present about £1,000,000 worth of overhead line work. Speaking of the good relationships existing between the company and its employés, Mr. Sinclair said that the directors had resolved to provide a convalescent home, without charge for interest or sinking fund, so long as the employés subscribed to maintain it. The board had also voted £1,000 for the furtherance of the Cancer Campaign. To illustrate the growth of the undertaking, the chairman said that in 1902 the Helsby Works of the Telegraph Mfg. Co., Ltd., employed 2,150 hands, and paid them £232,000. The number now employed was 8,200, and the wages and salaries amounted to £1,023,000.

Sir Alexander Roger, seconding the motion, paid a tribute to Mr. Sinclair, and pointed out that if anyone had kept an original £5 share, it would now be worth £40. The report and accounts were adopted.

Midland Electric Corporation for Power Distribution, Ltd.

Speaking at the annual meeting on March 20th, the chairman (Mr. Dane Sinclair) said that the profits had increased satisfactorily. The sale of the Ocker Hill power station to the West Midlands Joint Electricity Authority, of which the company was a member, was completed on December 31st last. The company thus did not now own any generating plant, but would simply distribute power obtained from the Authority in bulk. At present the cost was greater than when the company generated its own energy, but when the Ironbridge station was in operation and the Authority's stations were properly linked up, the cost was expected to be lower. New offices, stores and garages had been acquired at Ocker Hill for the accommodation of the mains staff, but apart from that the capital expended related to additional mains, transformers and apparatus rendered necessary by the continued expansion of the business. To encourage consumption the company had arranged for the supply of installations and apparatus to residential consumers on hire-purchase terms. A showroom would be opened at Stourbridge in the immediate future. Practically the whole of the debenture stock had now been redeemed; only a few outstanding holdings remained, and those had been provided for. The reserve fund at £350,000 equalled the ordinary capital, and it was proposed to capitalise it and distribute it in the form of ordinary shares (one for one) to the existing shareholders. It was not expected that there would be an immediate increase in the aggregate amount of the dividend. The report and accounts were adopted, and at a subsequent extraordinary meeting a resolution was passed increasing the capital of the company to £1,000,000 by the creation of 400,000 £1 shares.

Marconi International Marine Communication Co., Ltd.

The gross receipts for the year ended December 31st last rose from £890,865 to £912,640, and the net profit from £126,132 to £179,730. The good result is attributed to the freedom of the shipping industry from labour troubles and lower rebates in respect of idle tonnage. Other contributory factors were the economies effected in working during the past two years and the working arrangement with the Radio Communication Co., Ltd. There has been no change in the position with regard to the company's unascertained liability for excess profits duty. An increase in investments in subsidiary companies is mainly due to shares and debentures to be received in an Italian National Co. in consideration for the transfer of licence rights, &c., in Italy. The International Radiotelegraph Conference decided last year that spark installations of more than ¼ kW should be eliminated from ship use by the end of 1969. As this involves the company in a certain amount of compulsory obsolescence, the directors have decided to set aside from last year's profits the sum of £25,000, and further consideration is to be given to the matter. The directors recommend a final dividend of 8¼ per cent., making 12½ per cent. for the year, against 8¾ per cent. for 1926. The report makes reference to the death of Mr. S. St. J. Steadman and the appointment of Sir William Slingo and Mr. L. G. Sherlock to the board. Meeting: To-day (Friday).

City of London Electric Lighting Co., Ltd.

The annual meeting took place on March 21st, Mr. J. B. Braithwaite (chairman) presiding. In presenting the report and accounts (*vide* ELEC. REV., March 16th, p. 476), the chairman pointed to the reduction in generating costs brought about by the new boilers and generating plant, and said that their station could compare with any other in the world for economical operation. He referred to the South-East England Electricity Scheme, and stated that the Bankside station had been "selected." That would remove a handicap under which the company laboured. So far they had been confined to the "one square mile"; in the future they might be able to give people outside the area a bulk supply. In spite of the outcry against prices which had been raised, the electricity undertakings were reducing their prices more rapidly than the gas companies were, and he quoted figures to prove his statement. Considering the nature of the load, the company did very well to supply electricity at an average of less than 2½d. per kWh. It was true that the maximum price in London was greater than in New York, but the American consumer had to use a very large amount before he was supplied at a really low rate. The company had been a pioneer in supplying electricity for heating purposes, and it had just instituted a new low-temperature heating system which should prove of great advantage to the consumers.

Clyde Valley Electric Power Co.

The report for 1927 shows a balance of profit of £288,166 (against £226,700 in 1926). The addition of £50,124 brought forward makes available £338,290. After providing for the preference and ordinary dividends (the latter being maintained at 8 per cent.), and transferring £100,000 to contingency fund, a balance of £84,290 remains to be carried forward. The construction work at the Falls of Clyde was so far advanced as to permit of the generation of electricity at Stonebyres in July, and at Bonnington in December. Under the Central Scotland Electricity Scheme the Yoker and Clyde's Mill steam stations and the two hydro-electric stations mentioned above have been "selected," and on the completion of the Central Electricity Board's main transmission lines they will continue to be operated by the company. The development of the area of supply progresses satisfactorily, and in order to popularise the use of electricity among the smaller householders an assisted wiring scheme is being inaugurated. Meeting: April 4th.

Potteries Electric Traction Co., Ltd.

The report for the past year shows a total revenue of £254,753 (against £251,914), and a net revenue of £24,329 (including £2,549 brought forward). Debenture and loan interest absorbs £15,928, £5,000 is put to reserve, and £3,400 is carried forward. The reserve now stands at £130,095, and the renewals funds at £43,539. The arrears of dividend on the 5 per cent. cumulative preference shares now amount to £47,469. Bad weather affected the results, and a loss was again incurred in maintaining the tramcar services. An agreement has been made with the Stoke-on-Trent Corporation for the substitution of omnibuses for tramways in the city, and similar arrangements have been made with the Newcastle-under-Lyme Corporation and Wolstanton United U.D.C. Orders have been placed with the Brush Electrical Engineering Co., Ltd., for a number of omnibuses, the delivery of which is to commence this month.

Cambridge Electric Supply Co., Ltd.

After providing for debenture interest and taxation, the accounts for 1927 show a credit balance of £24,089, to which is added £4,904 brought forward, making £28,993. The general reserve receives £10,000 and the staff benevolent fund £1,500, £3,000 is written off capital expenses, and 7 per cent. is to be paid on the ordinary shares (as in 1926), leaving £4,807 to be carried forward. During the year the £10 ordinary shares were divided into £1 shares, and an issue of 160,000 new £1 ordinary shares was made. Out of the proceeds the "C" debentures (£30,000) and the bank loans have been paid off. Messrs. S. R. Ginn and R. C. Pierce have resigned from the board, and their places have been taken by Messrs. P. D. Tuckett and C. H. Jones. Mr. Tuckett has been appointed chairman in the place of Sir R. Forsyth Scott, who has become vice-chairman. Mr. A. A. Campbell Swinton has been succeeded by Mr. A. N. Rye as managing director, but he remains on the board. Considerable capital expenditure was incurred during the year, principally on cables, and all the new work was arranged to be suitable for a change-over to 50 cycles. Meeting: April 3rd.

Folkestone Electricity Supply Co., Ltd.

An increase in connections of 661 kW is reported for the year ended December 31st last, bringing the total to 9,173 kW. The profit for the year was £44,920 (against £39,176), and to it is added £1,498 brought forward, making £46,418. After meeting debenture interest, preference dividend, &c., £10,019 is allocated to depreciation, £7,000 to reserve, and £7,275 to employés' superannuation fund. A final dividend of 6 per cent., free of tax, is recommended on the old ordinary shares, making 10 per cent., tax-free, for the year (the same) and one at the rate of 10 per cent. calculated from the due date of instalments on the new ordinary shares. During the year an issue of 40,000 new ordinary shares was made. The directors are reducing the charges from the next meter readings. The death of Mr. F. E. Gripper is recorded, and it is stated that Mr. F. Hall, the secretary, has been appointed to the board. Meeting: To-day (Friday).

British Aluminium Co., Ltd.

The report for the year ended December 31st last records a net profit of £432,177, and, adding £26,567 brought forward, £458,744 is available (against £304,644). Taxation, debenture charges, &c., are provided for, £50,000 is put to depreciation reserve, £100,000 to reserve (making £750,000), and £10,000 to staff benefit fund. A final dividend of 6 per cent. is recommended on the ordinary shares (making 10 per cent. for the year, as in 1926), and £27,858 is carried forward. The capital expenditure during the year was £31,875. The demand for the company's products was well maintained throughout the year, but the prices obtained were considerably below those ruling in 1926. The report records the death of Mr. James Taylor and the appointment of Mr. W. Murray Morrison to the board. Meeting: To-day (Friday).

Waste Heat and Gas Electrical Generating Stations, Ltd.

The directors report a net profit of £28,348 for the past year, as compared with £24,024 in 1926. A net balance of £12,496 brought forward is added, making £40,844. The dividend is maintained at 8 per cent. (An interim dividend of 1½ per cent. was paid in August last). No expenditure was incurred on capital account during the year. The amounts received as hire-purchase instalments have been invested as to £1,200 in 5 per cent. debenture stock of the County of London Electric Supply Co., Ltd., and the balance in Government securities. The output from the stations was satisfactory, but two stations are at present out of action owing to the state of trade in the coal and iron and steel industries. The meeting was held on Wednesday last.

Davis & Timmins, Ltd.

Speaking at the annual meeting last week, the chairman (Mr. F. Le Neve Foster) said that the profits had increased, but not so much as they had hoped. The year had been a difficult one, for home and foreign competition was keen. The board was concentrating on the reduction of production costs, and during the current year a large amount of the latest machinery had been ordered. Thus, within the next few months they would have an automatic shop second to none in this country so far as their class of business was concerned.

Vickers, Ltd.

The report for the year ended December 31st, 1927, shows a balance of £992,985 to the credit of profit and loss account after meeting debenture and depreciation charges (against £562,284 for 1926). The addition of £134,868 brought in, gives an available amount of £1,127,853. The preference dividend is paid, a sum of £238,211 is transferred to reserve (against £200,000), and a dividend of 8 per cent. against *nil*) is recommended on the ordinary shares, leaving £208,722 to be carried forward. The report mentions the formation of Vickers-Armstrong, Ltd., and says that it is proposed to transfer the aviation business and the Crayford undertaking to separate companies. Sir Vincent Caillard and Mr. A. Cartwright have resigned from the board, and Gen. Sir Noel Birch, G.B.E., and Mr. G. G. Sim, C.S.I., have been elected directors.

Anglo-Portuguese Telephone Co., Ltd.

The report for 1927 shows a net profit of £31,412, as compared with £32,773 in 1926. To this are added £33,119 brought forward and £32,223 arising from the release of sinking funds for debenture stocks now redeemed, making available £96,754. A final ordinary dividend of 5 per cent. is recommended, making 8 per cent. for the year (against 7 per cent.), and £57,801 is to be carried forward. At the beginning of the current year the company received a new 40-year concession from the Portuguese Government, and provision is made for an extension of 25 years. Meeting: April 3rd.

Newcastle and District Electric Lighting Co., Ltd.

The profit for the year ended December 31st last was £72,636, and to this is added £15,555 brought forward, making £88,191. After meeting debenture charges, £21,500 is allocated to depreciation (against £18,000), £10,000 is transferred to reserve (against *nil*), and a dividend of 7½ per cent. is being paid (against 7 per cent.). A balance of £15,658 is carried forward. Meeting: To-day (Friday).

Constantinople Telephone Co.

It is reported that the arrears of interest on the bonds and certificates have been discharged. The profit for the past year, after providing for this and for contingencies, was £T4,668. Against this is charged a debit balance of £T190 brought forward, leaving £T4,478 to go over to the next accounts. The Government has approved the principle of a sliding-scale tariff, but the increases have not yet been authorised.

Stock Exchange Notices.

Dealings in the following have been specially allowed by the Committee under Rule 159:—

Pinchin, Johnson & Co., Ltd., 169,750 new ordinary shares of £1 each (issued at £2 per share) fully-paid, Nos. 679,001 to 848,750.

Marconi's Wireless Telegraph Co., Ltd.—34,847 ordinary shares of £1 each fully paid, Nos. 3,000,066 to 3,034,912.

Tyneside Electrical Development Co., Ltd.

The profit for 1927 was £4,508 (against £4,064), and £809 brought forward is added, making £5,317. The dividend on the deferred ordinary shares is again 10 per cent., £500 is transferred to reserve, and £1,115 carried forward. During the year the authorised capital was increased by £50,000 to £150,000, and £25,000 in £1 cumulative 6 per cent. preferred ordinary shares has been issued.

Greengate and Irwell Rubber Co., Ltd.

The directors report a total profit (including interest on investments) of £96,660 (against £48,001 for 1926). It is proposed to place £20,000 to reserve (against *nil*), to allot £1,000 to an employés' pension scheme, to pay a final dividend of 1s. 6d. per share on the ordinary shares (making 14 1/16 per cent., against 9¾ per cent.), and to carry forward £24,379.

Hoffman Manufacturing Co., Ltd.

At the annual meeting last week the chairman (Mr. A. O. Peech) said that the control of the company had recently been acquired by Messrs. Brown, Bayley, and that would entail an alteration in the composition of the board. An ordinary dividend of 6 per cent., free of tax, making 10 per cent., tax free, for the year, was approved.

Pinchin, Johnson & Co., Ltd.

After commenting upon the continued success and strong financial position of the company, at the annual meeting last week, Mr. E. Robson (chairman) said that they considered it possible that some of the accumulated reserves and surplus would be issued to shareholders in bonus share form within the next twelve months.

New Issue.

Gramophone Records, Ltd.—This company issued a prospectus on Tuesday last, offering for subscription 400,000 ordinary shares of 10s. each and 400,000 deferred shares of 1s. each. The company was recently formed to acquire the sole licence for a process of electrically-recording sound on gramophone disks invented by Mr. Adrian F. Sykes, who is the company's technical adviser, and to manufacture electrical amplifying apparatus, &c. The directors of the company include Mr. Guy Burney (formerly managing director of the Sterling Telephone and Electric Co., Ltd.), Lt.-Col. Adrian Simpson (late deputy managing director of Marconi's Wireless Telegraph Co., Ltd.), and Mr. R. H. Wheeler (director, Arrol-Johnston & Aster Engineering Co., Ltd., &c.). The balance of the capital consists of 900,000 deferred shares of 1s. each. The list was to close on or before to-day (Friday).

Annual Meetings.

The annual meetings of the following companies were held on Tuesday last:—The County of London Electric Supply Co., Ltd.; the Kensington and Knightsbridge Electric Lighting Co., Ltd.; the Newcastle-upon-Tyne Electric Supply Co., Ltd.; and Ericsson Telephones, Ltd. Reports of these and other meetings held this week will appear in our next issue.

Lancashire Dynamo and Motor Co., Ltd.

The report for the year ended December 31st last states that the exchange of shares between the company and the Crypto Company has been duly carried out. The directors consider that the amalgamation will prove of great benefit to all shareholders. The profit, after charging the debenture interest and depreciation, is £19,726 (against £6,801 for 1926 and £20,201 in 1925); to this is added £4,128 brought forward, making £23,854. The appropriations include £5,000 for the reserve, and an ordinary dividend of 5 per cent. is proposed, as for 1926. A balance of £5,350 is carried forward. The loose tools and patterns have been written down by £6,637 from the income tax surplus reserve, leaving £9,000 for contingencies. Meeting: April 3rd.

Hendon Electric Supply Co., Ltd.

Out of the profits for the past year £7,500 has been placed to repairs and renewals fund, £1,441 to general reserve, and £8,000 to income tax account. It is proposed to pay a final ordinary dividend of 2s. per share, free of tax. The interim dividend was 5 per cent., free of tax, and the total distribution is the same as for 1926. A balance of £9,748 is carried forward.

Peterborough Electric Traction Co., Ltd.

The accounts for the past year show that the revenue increased from £40,536 to £48,452, and the net profit was £5,464. The amount available, after charging bonus to staff and adding £3,825 brought forward, is £8,872. It is proposed to place £1,297 to reserve and maintain the ordinary dividend at 10 per cent., leaving £4,255 to be carried forward.

P. & W. MacLellan, Ltd.

Out of the surplus of £15,985 for 1927 the directors propose to pay a half-year's dividend on the preference shares, leaving £6,985 to be carried forward.

Victoria Falls and Transvaal Power Co., Ltd.

The net earnings for the quarter ended December 31st, 1927, before providing for British and South African taxation, were £270,431.

Scottish Tube Co., Ltd.

The profit for the past year, before meeting debenture interest, rose from £29,821 to £70,890. The ordinary dividend is 7 per cent. against *nil* for 1926.

Egham and Staines Electricity Co., Ltd.

The directors report a profit of £29,507 for 1927, against £20,247 in the preceding year. A dividend of 7½ per cent. is recommended on the ordinary shares (against 5 per cent.).

Stewarts & Lloyds, Ltd.

Out of a profit of £615,742 for 1927 a dividend of 1s. per share is being paid on the deferred shares.

Montreal Light, Heat and Power Co.

A dividend of $0.5 per common share has been declared in respect of the quarter ending March 31st.

Calgary Power Co.

A dividend of 1¼ per cent. has been declared.

German Companies.

The *German Telephone and Cable Industry Co.*, Berlin, reports that favourable activity took place in 1926-27, but sale prices in all branches were insufficient. The decline in telephone deliveries to the Post Office was compensated for by an increase in private telephone work. In the cable department the turnover was higher than in the previous year, and the present stock of orders is satisfactory. Including the balance forward, the net profits amount to 593,000 marks, against 509,000 marks in 1925-26, and the dividend is raised from 6 to 7 per cent.

The *Electricity Supply Company*, Berlin, reports net profits from works and investments amounting to 3,230,000 marks for 1927, as compared with 2,300,000 marks in the preceding year. The dividend of 10 per cent. is maintained on the increased capital (30 million marks).

The *German-Atlantic Telegraph Co.*, Berlin, states that traffic has increased since the bringing into operation of the cable to the Azores, and the receipts have fulfilled expectations. It is proposed to pay a dividend of 7 per cent. for 1927, against nil for 1926.

The report of *Brown, Boveri and Co.*, Mannheim, states that a further rise in the orders received took place in 1927, and the stock of orders brought over into the new year also showed an increase. The net profits rose from 1,030,000 marks to 1,470,000 marks, and the dividend is raised from 8 per cent. to 9 per cent. It is proposed to increase the share capital from 15,000,000 marks to 25,000,000 marks.

Dutch Company.

It is reported that the *Dutch Cable Works* has declared a dividend of 30 per cent. for 1927, as against 24 per cent. for 1926.

Stocks and Shares.

MONDAY EVENING.

DURING the past week members and their staffs have been grappling with what is probably the biggest settlement in the history of the Stock Exchange. In spite of this there has been no diminution of activity. Business has again been on an enormous scale, and has embraced practically every market. As regards the Funds, end-of-the-month monetary stringency has tended to give a quiet tone to the Gilt-Edged Market, but the market in Foreign Government Securities has been more active than of late, with interest focused on the more speculative issues. The Industrial Market has, of course, continued to receive the lion's share of speculative attention, and there has been a distinctly better tendency in both Oil and Rubbers, the two markets which have been for many months past the "Cinderellas" of the House.

Home Rails.

Business in the heavy Railway Stocks has been very dull, a reflection of the continual disappointing traffics. The London group, however, was again exceedingly active. Undergrounds at one time touched 25s. 6d., and at this figure met with a good deal of profit-taking, which succeeded in lowering the price to just under the 25s. mark. The 6 per cent. income stock opened the week in a very active manner, jumping to 120, from which it subsequently reacted to 116. Metropolitans revived somewhat on absorption talk, but afterwards relapsed, and are unchanged on the week at 67, as are Districts at 72¼.

Cables.

It was only to be expected that the Cable Market would be rather tired after its hectic behaviour of the previous week. The Marconi Group were the principal sufferers, having to sustain a considerable amount of profit-taking. The ordinary shares fell away a little each day, and are now 63s. 9d., as against the highest of 71s. The preference and debenture stock are both dull in sympathy, and finish the week at £5 and 182 xd, after having been somewhat lower. Marconi Marines were cheerful on the increased dividend, but failed to maintain their rise, and relapsed below the previous week's level. Canadian Marconis dropped a good deal of their spectacular rise, and were at one time no better than 23s., from which figure they recovered to 26s. The Submarine Cable Group were very much steadier, and in practically every case have managed to remain at their new price level, Westerns, for instance, being 19½. Great Northerns were 10s. up at 39, and a bright spot was Indo-European, which touched 40, a rise of no less than five points. Anglo-American deferred put on 1¼ at 24¼, and United River Plate spurted to 11¼ on buying from the other side, coupled with rumours of possible absorption.

Home Electricity Supply.

Interest in the Home Electric Market seems to broaden and increase week by week, and during the period under review business has been exceptionally active. For price movement pride of place must be given to Isle of Thanet Electric ordinary, which at one time touched 38s. 6d., as against 21s. 6d. no more than a month ago. Rumours are still persistent that proprietors are about to receive a bid for their holdings, the price mentioned ranging between 40s. and 45s. The concerns talked of in the capacity of would-be buyers are the County of London Electric Supply Co., whose bulk supply area touches that of the Isle of Thanet Co., and, alternatively, the Greater London and Counties Trust, who, by virtue of their control of the Edmundsons Company, own the Ramsgate Electric Supply Co. with an area adjacent to that of the Isle of Thanet Company. The 6 per cent. participating preference shares rose to at one time 31s., and are now 28s. As they have participating rights "all the way up" and possess the same voting powers as the ordinary, it would seem that if a bid is forthcoming it would have to be made for the preference as well as for the ordinaries, and it is rather surprising that there is such a wide margin between the prices of the two shares. If anything the preference should stand a little higher than the ordinary. All the shares which have been prominent of recent months on the hopes of possible absorption "à la Edmundsons" still continue to be extremely active. Electric Supply and Urban at 53s. and 52s. 6d., respectively, are both higher on the week, whilst Metropolitans are unchanged after having been somewhat higher. County have relapsed, without any particular reason, to 35s. Bournemouth and Poole at 71s. were inclined to boil over, but Richmonds were in fairly good demand on dividend hopes, and rose to 36s. Egham and Staines sagged to 28s., in spite of the increase in dividend to 7½ per cent., as against 5 per cent. a year ago, which probably has not yet had time to "sink in," as the report was only out this morning. A bright spot was Newcastle and Districts, which were 27s. bid on the increased dividend. Folkestones were unmoved on the report, but Midland Electric Corporation for Power Distribution ordinaries retained their rise to 73s., in spite of the warning of the chairman at the meeting that, although the company is distributing a 100 per cent. share bonus, it does not by any means follow that that act foreshadows an increase in the *actual* dividend to be paid for the current year.

Of trusts connected with electricity, dealings started in the new West London Provincial Electric Trust £5 shares at 42s. 6d. premium, and Beaver Trust were in inquiry round 23s. 6d.

Bulk Supply and Others.

The shares of the Parliamentary Companies were again extremely active, although there are not many price alterations to record. Clyde Valleys were in inquiry at 34s. on the excellent figures and exceedingly sound balance sheet position. Certain holders are wondering how long it will be before the inevitable share bonus eventuates, as reserves are now equal to over 80 per cent. of the ordinary share capital. Yorkshire new are a little below the best at 8s. 3d., after having been 9s., with the old ordinary 33s. 6d. Newcastles were an active feature and were harder at 26s. 9d., with the new 26s. 3d. To-morrow's annual general meeting is being looked forward to with considerable interest. Midland Counties, although fairly active, were unchanged at 26s. 6d. x.d. It is understood that an issue of ordinary shares at about 24s. is imminent. The Foreign Lighting Section has given us the most sensational movement of the week in Mexican Light and Power common, which, as a result of aggressive Continental buying, appreciated at one time to 117½, a rise of the best part of 30 points. Subsequent profit taking caused a relapse to around 110. The 7 per cent. 1st preference were also an active spot, and are now 84, and as a result attention has been drawn to the merits of the 4 per cent. $5 2nd redeemable preference shares, which rose sharply to 75s., but afterwards reacted to 67s. 6d. Barcelonas, International Holdings, and Hydro-Electric Supplies have again been active, principally on Brussels buying, and in some quarters are talked considerably higher. Calcutta Supply at 47s. and East Africans at 28s., were both in inquiry, the latter in anticipation of increased distribution for 1927.

Holders of Monterey Railway, Light and Power 5 per cent. "A" debenture stock are again being asked by the trustees for tenders of stock on account of the sinking fund. This is rather peculiar, because the same thing happened only last December, since when they have been approached by a firm of stock-brokers who were potential purchasers. The stock is now 60 bid in the market, and it certainly seems as if holders might "sit tight" and watch events for a while.

Tramways.

Tramways were less dull than of late, and, in fact, presented one or two interesting features. The securities of the London United Tramways and London Suburban Company were all harder, and British Electric Traction deferred was marked up 5 points to 520, with the 8 per cent. preferred ordinary in investment demand at 125. Potteries, both ordinary and preference, were in speculative demand on the report, which showed an improved revenue position for 1927. The ordinaries are now 4s. 3d. bid, with the preference 8s. 6d. Lancashire United Transports were also fairly active, but without affecting the price, which remained at 8s. 6d. So much for Home affairs. The outstanding share in the Foreign Tramways was Mexico Tramways common, which spurted in sympathy with the movement in Mexican Lights and other Belgo-Canadian public utilities, and finished the week at 46, a rise of 6 points. Brazilian Traction common, at first, were rather off colour and dropped to 214, from which they made a smart recovery to 221. British Columbia Electric Railway stocks were all good, the deferred now being 223, with the new deferred shares 24s. 6d. premium. The preferred ordinary shares were also in demand, and at 170 gained 3½ points. It is interesting to note that both these stocks at the present prices, after allowing for income tax, now yield less than the average British Government stock. Anglo-Argentine Tramway issues were inclined to be uninteresting, but there was more doing in some of the smaller non-dividend payers, such as Pernambucos at 8s., with the preference 18s., and La Platas 4s. 6d. Buenos Aires Town and Docks Tramways ordinary were asked for round 8s. 3d. on increased dividend hopes, but Para Electric Railways were inclined to sag away, the ordinary now being no better than 2s. 9d. against about 4s. 6d. earlier in the year.

Manufacturing.

The ordinary shares of the Electrical Equipment Companies were inclined to harden during the past week, and General Electrics are now 36s. English Electric ordinary and preference came in for a little speculative attention on merger talks, and are now 9s. and 12s. 6d. respectively. The market says that if the ordinaries are worth 9s. it would seem that the preferences should be worth more than 12s. 6d. as they now carry 9 per cent. arrears of dividend, and if there is any capital writing down to be done there is a large amount of ordinary share capital to bear the brunt, but the market is by no means unanimous that the ordinaries are worth 9s.!

Cable makers' shares were good. Callender Cables are 7s. 6d. up at 4½, Henleys gained 2s. 6d. at 5⅜, and Telegraph Construction ordinaries enjoyed a smart rise to 25½. A feature of strength was Babcock & Wilcox, which spurted to 75s., a sudden demand finding the market somewhat short of stock. Metropolitan-Vickers were inclined to be tired, and shed 1s. to 31s., and may go lower, as even at this price they yield under 4 per cent. Another share with a sagging tendency was British Aluminium ordinary. As the dividend and annual meeting is now past, there appears nothing (in Stock Exchange parlance) "to go for" for the time being. Power Securities ordinary were somewhat in the limelight and touched over 29s., it being thought that the large electrical supply schemes now on the tapis should bring a considerable amount of business to this concern during the next few years.

Share List of Electrical Companies.

	Nom. £	Dividend. 1926.	Dividend. 1927.	Price Mar. 26. 1928.	Rise or fall.	Yield. p.c.
Home Electricity Companies.						
Bournemouth and Poole	1	14†	—	71/-	—1/-	3 18 10
Brompton Ordinary	1	8¾	—	26/-	+6d.	5 7 8
Charing Cross Ordinary	1	8½	8½	26/6xd	—	5 5 8
do. do. 4½% Pref.	1	4½	4½	17/6	—	5 2 10
Chelsea	1	8¾	—	26/-	—	5 7 8
City of London	1	10	10	30/-xd	—2/6	4 13 4
do. do. 6% Pref.	1	6	6	23/-xd	—	5 4 4
Clyde Valley	1	8	8	34/-	—	4 14 2
County of London	1	7½	7½	35/-	—1/6	4 5 9
do. do. 6% Pref.	1	6	6	23/-	—	5 4 4
Edmundsons' Ordinary	1	10	—	67/6	—	2 19 2
do. 7% Pref.	1	7	7	25/6	—	5 9 10
Elec. Supply Corporation	1	11	—	54/6	+2/6	4 0 9
Kensington Ordinary	1	8	8	26/-	—	5 7 8
Lancs. Light and Power	1	7½	—	30/-	—	5 0 0
London Electric	1	8½	8½	25/6xd	—	5 9 10
do. do. 6% Pref.	5	6	6	5½	—	5 8 2
Metropolitan	1	8	9	47/-	—	3 18 3
do. 4½% Pref.	1	4½	4½	17/6	+6d.	5 2 10
Midland Counties	1	6	6½	26/6xd	—	4 18 1
Newcastle-on-Tyne Ordinary	1	5	6	26/6	—	4 10 7
do. 5% Pref.	1	5	5	18/9	—	5 6 8
do. 7% Pref.	1	7	7	26/-	—	5 7 8
Notting Hill 6% Pref.	10	6	6	10½	—	5 11 7
North Met. Elec. 6% Pref.	1	6	6	23/-	—	5 4 4
St. James' and Pall Mall	5	8	8	26/6	—	5 5 8
South London	1	8½	8½	26/-	—	5 7 8
South Metropolitan Pref.	1	7	7	1½	—	6 3 0
Urban Ordinary	1	7	—	52/6	+1/6	2 13 4
do. 6% Pref.	1	6	6	1⅛	—	5 13 0
Westminster Ordinary	1	8½	8½	26/-	—	5 7 8
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/7½xd	—	6 18 9
Yorkshire Elec.	1	8	8	33/6	—	4 15 7
Home Rails.						
Central London Ord. Assented	Stock	4	4	74½	—	5 7 5
Metropolitan	,,	3	3	67xd	—	4 9 7
do. District	,,	3½	4	72½xd	—	5 13 4
Underground Electric	£1	1½	5	24/6	—6d.	4 1 8
do. do. Income	Bonds	6	6	116	—3	5 3 5
Telegraphs and Telephones.						
Anglo-Am. Tel. Pref.	Stock	6	6	98½	—	6 1 10
do Def.	,,	1½	1½	24¼	+1¼	6 3 9
Automatic Telephone	1	10	10	45/6xd	—1/6	4 7 11
Chili Telephone	5	6	—	7⅞	—	*3 18 3
Eastern Extension	10	10	10	19½	—	*5 2 7
Eastern Tel. Ord.	Stock	10	10	200	—	*5 0 0
Globe Tel. and T. Ord.	10	10	10	21	+1	*4 15 3
do. do. Pref.	10	6	6	10¼	—	5 17 1
Great Northern Tel.	10	20	—	39	+½	5 2 7
Indo-European	25	10	—	40	+5	*5 0 0
Marconi	10/-	5	—	63/9	—2/3	3 2 11
Marconi-Marine	1	8¾	12½	41/6	—2/-	6 0 6
Oriental Telephone Ord.	1	12	—	52/6	+1/3	*4 11 7
United R. Plate Tel.	5	8	8	11¼	+1	*3 11 1
Western Telegraph	10	10	10	19½	+½	*5 2 7
Home and Foreign Trams, &c.						
Anglo-Arg. Trams First Pref.	5	5½	5½	8¾	—	7 6 8
do. do. 2nd Pref.	5	6	6	8⅛	—	7 17 4
do. do. 5% Deb.	Stock	5	5	78½	—	6 7 5
British Electric Traction Def. Ord.	,,	—	—	520	+5	... ...
do. do. 8% Pref. Ord.	,,	8	—	124½	—	6 8 6
Brazil Traction	100	6	—	221	+4½	2 14 3
Brit. Columbia Elec. Rly. Pcs.	Stock	5	5	94½	—	5 5 10
do. do. Preferred	,,	6½	6½	170	+3½	*3 13 6
do. do. Deferred	,,	8	8	223	+8	*3 11 9
do. do. Deb.	,,	4½	4½	81½xd	—2	5 4 4
London & Sub. Trac. 5% Pref.	1	Nil	Nil	8/6	+6d.	... ...
London United Tram Deb.	Stock	4	4	57½	—	6 19 2
Mexico Trams, 5% Bonds	—	5	5	81	+1	6 6 3
Mexican Light Common	100	Nil	Nil	109½	+2½	... ...
do. 7% Pref.	100	Nil	7	84	+6	8 6 6
do. 1st Bonds	—	5	5	82½	—	6 6 2
Yorkshire (West Riding)	1	Nil	Nil	7/6	—	... ...
Manufacturing Companies.						
Babcock & Wilcox	1	13	—	72/6	+3/6	3 11 9
British Aluminium Ord.	1	10	10	47/6	- 6d.	*4 4 2
British Elec. Transformer Pref.	1	7	7	19/-	—	7 7 4
British Insulated Ord.	1	15	15	4¾xd	—	3 12 8
Brush Ord.	1	10	—	29/-	—	6 17 11
Callenders	1	15	—	4½	+⅛	3 6 8
do. 6½% Pref.	1	6½	6½	23/-	—	5 9 5
Crompton Parkinson Pref. Ord.	1	—	—	17/6	—	... ...
Edison-Swan	4/-	10	10	10/-	—	4 0 0
do. 5% Deb.	Stock	5	5	90	—	5 11 0
Electric Construction	1	7½	—	26/-	—	5 15 5
Enfield Cable Pref.	1	7½	7½	26/3	—	5 14 8
English Electric	1	Nil	Nil	9/-	+1/6	... ...
do. do. Pref.	1	3	Nil	12/6	+1/-	... ...
Gen. Elec. Pref.	1	6½	6½	24/-	—	5 8 4
do. Ord.	1	7½	—	36/-	+1/-	4 3 4
Henley	1	25	—	5⅜	+⅜	4 9 0
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	Nil	Nil	12/6	—	... ...
Johnson & Phillips	1	12½	—	53/9	—	4 12 7
Met.-Vickers Ord.	1	8	6	31/-	—1/-	3 17 5
do. Pref.	2	8	8	2⅜xd	—	6 1 11
Siemens Ord.	1	7½	—	29/-	—	5 3 5
Telegraph Construction	12	10	10	25½	+2	*4 14 1

* Dividends paid free of Income Tax.
† 4% of which was Tax Free.

Minor African Markets.

Imports during 1925 and 1926 into Nigeria, the Gold Coast, Sierra Leone, Kenya and Uganda, and Tanganyika.

THE market for electrical goods in West and East Africa is steadily expanding, as will be seen from the following statistics relating to the Gold Coast, Nigeria, Sierra Leone, Kenya and Tanganyika, which have been compiled from official sources. It will be noticed that although less electrical machinery has been purchased, there were very healthy increases in the imports of electrical and telegraphic apparatus into all the markets in question. The values for 1926 for all such goods are given below, with comparative figures for 1925 and notes of increases or decreases:—

Imports into Nigeria.

	1925. £	1926. £	Inc. or dec. £
Electrical machinery—			
Total	19,600	7,800	−11,800
From United Kingdom ...	5,700	4,800	− 900
,, U.K. Government ...	12,000	2,500	− 9,500
,, United States ...	50	100	+ 50
,, Germany	1,900	270	− 1,630
Electrical and telegraphic apparatus—			
Total	32,500	47,000	+14,500
From United Kingdom ...	3,500	9,700	+ 6,200
,, U.K. Government ...	28,000	31,000	+ 3,000
,, Germany	800	5,800	+ 5,000

Imports into the Gold Coast.

Electrical and telegraphic apparatus—			
Total	36,000	66,700	+30,700
From United Kingdom ...	6,600	4,400	− 2,200
,, U.K. Government ...	29,000	60,000	+31,000
,, Germany	200	460	+ 260
,, United States ...	340	1,400	+ 1,060
Electrical machinery—			
Total	22,000	14,800	− 7,200
From United Kingdom ...	11,500	13,400	+ 1,900
,, U.K. Government ...	9,800	1,300	− 8,500
,, Germany	250	—	− 250
,, United States ...	250	—	− 250

Imports into Sierra Leone.

Electrical and telegraphic apparatus—			
Total	16,000	40,700	+24,700
From United Kingdom ...	13,000	19,000	+ 6,000
,, U.K. Government ...	3,000	20,000	+17,000
Industrial machinery—			
Total	1,200	1,800	+ 600
From United Kingdom ...	930	1,100	+ 170
,, U.K. Government ...	125	100	− 25

Imports into Kenya and Uganda.

Electric wires and cables, insulated—			
Total	8,400	8,800	+ 400
From Great Britain ...	8,200	7,300	− 900
,, Germany	80	160	+ 80
,, Belgium	—	800	+ 800
Ditto on Govt. account.* ...	—	1,800	+ 1,800
Electric wires and cables, uninsulated—			
Total	2,200	2,400	+ 200
From Great Britain ...	—	1,800	+ 1,800
,, Belgium	—	400	+ 400
Electrical goods and apparatus, n.e.s.—			
Total	20,500	25,000	+ 4,500
From Great Britain ...	17,700	16,700	− 1,000
,, Germany	1,900	1,500	− 400
,, United States ...	500	4,800	+ 4,300
Ditto on Govt. account* ...	6,000	9,700†	+ 3,700
Telegraph and telephone instruments and apparatus—			
Total	900	16,000*	+15,100
Ditto on Govt. account* ...	12,000	15,000	+ 3,000
Electrical machinery and parts—			
Total	27,500	13,000	−14,500
From Great Britain	21,000	9,500	−11,500
,, Belgium	2,300	100	− 2,200
,, Sweden	1,400	250	− 1,150
,, United States ...	2,000	3,000	+ 1,000
Ditto on Govt. account* ...	3,500	500	− 3,000
Engines, steam—			
Total	36,600	17,600	−19,000
From Great Britain ...	32,000	11,700	−20,300
,, United States ...	—	3,000	+ 3,000
,, Germany	4,000	3,000	− 1,000
Ditto on Govt. account* ...	3,000	—	− 3,000
Industrial machinery and parts—			
Total	236,000	153,000	−83,000
From United Kingdom ...	193,000	121,000	−72,000
,, India	7,000	3,000	− 4,000
,, Germany	20,000	12,000	− 8,000
,, United States ...	11,000	13,000	+ 2,000
Pumps and pumping machinery—			
Total	9,000	9,500	+ 500
From United Kingdom ...	7,500	7,600	+ 100
,, United States ...	700	1,700	+ 1,000
Machinery, not specified, other than agricultural—			
Total	25,000	69,000	+44,000
From United Kingdom ...	21,000	63,000	+42,000
,, Germany	2,000	4,000	+ 2,000
,, United States ...	1,500	1,000	− 500

* Mainly from Great Britain.
† From Great Britain £5,200, from United States £4,400

Imports into Tanganyika.

Wires and cables, insulated—			
Total	860	1,200	+ 340
From United Kingdom ...	660	1,100	+ 440
,, Germany	180	90	− 90
Electrical goods and apparatus, n.e.s.—			
Total	3,300	12,700	+ 9,400
From United Kingdom ...	2,400	11,000	+ 8,600
,, Germany	500	700	+ 200
Telegraph and telephone instruments and apparatus—			
Total	8,400	7,000	− 1,400
From United Kingdom ...	8,300	7,000	− 1,300
Electrical machinery—			
Total	190	80	− 110
All from U.K. in 1926.			
Steam engines—			
Total	10,600	10,500	− 100
From United Kingdom ...	4,800	3,700	− 1,100
,, Germany	4,200	5,800	+ 1,600
Lamps and lanterns—			
Total	10,300	11,400	+ 1,100
From United Kingdom ...	1,400	1,200	− 200
,, United States ...	2,200	2,600	+ 400
,, Germany	4,800	6,900	+ 2,100

Canada's Empire Shopping Week.

Under the auspices of an Advisory Council representative of the leading trade interests in Canada an Empire Shopping Week is being held in the Dominion from April 21st to 28th. The chairman of the executive committee is Mr. G. F. Braddock, Acting Senior Trade Commissioner in Canada and Newfoundland. The funds for the necessary propaganda, &c., are being raised by voluntary subscriptions, and British firms interested in the matter are being asked to contribute. A booklet issued in connection with the matter explains the objects of the Week and gives some interesting information. It is shown, for instance, that while before the war about 73 per cent. of Canada's imports were from foreign countries, by 1923 the proportion had risen to 80 per cent. and in 1927 was above that figure. It is stated that the *per capita* purchasing power of Canada is the world's third highest, and in a list of retail trade outlets "electric fixtures and supplies" are credited with 1,349, mainly in Ontario, Quebec and British Columbia. There are 3,912 retailers of radio equipment and supplies, mainly in Ontario and Quebec. The offices of the movement are at 23, King Street West, Toronto.

Australian Tariff Inquiry.

The inquiry by the Commonwealth Tariff Board into an application by Australian manufacturers for increases in the import duties on ironclad air-break switches and switch fuses, and circuit breakers, was closed on February 8th. The earlier proceedings were mentioned in our issue of March 2nd (p. 375). A representative of the British General Electric Co., Ltd., opposing the application, said that switchgear was already sold by Australian manufacturers at prices considerably below those of the British makers. It was true, however, that the British apparatus was still preferred. Later both parties asked the Board to conduct an inquiry into the home consumption prices and the cost of production of switches sold in Australia by a British company said to be the leading supplier to Australia of switchgear of the kind affected by the application.

The B.E.A.M.A.

The Report of the Council for 1927.

THE annual meeting of the British Electrical and Allied Manufacturers' Association was held at the offices on March 15th, Col. R. K. Morcom, chairman of Council, presiding. We give below an abstract of the report of the Council for the year 1927. At a subsequent meeting of the Council Col. Morcom was re-elected chairman for the new session.

The report states that the net output of 1927 was actually less than that of 1925, and trade only began to show signs of fundamental recovery in the late autumn, owing chiefly to the fact that, in a number of industries, such as iron, steel, and shipbuilding, considerable arrears of work had to be made good.

Abroad, the return to stable currency conditions, especially in Italy and France, initiated a period of acute depression, in which the majority of the European countries shared, with the exception of Germany. Germany, however, enjoyed a period of temporary prosperity, due to the large credits received from the United States, which were sufficient to stimulate home consumption, and new post-war records were established in the basic industries of that country.

The United States, which was confidently expected to achieve new records in 1927, suffered from an interruption in the upward curve of activity, and in the autumn was less productive than in any year since 1924.

World prices showed a tendency to become stable, with the possible exception of iron and steel, and, on the whole, the international trade situation was healthy.

Unfortunately, however, the comparative depression ruling on the Continent intensified competition in Britain later in the year and, in many branches of engineering, above all in electrical manufacture, severe competition of an unhealthy type was experienced. Both German and Swiss manufacturers made determined efforts to gain a footing in the British power market, with a view to sharing in the new contracts under the national power scheme.

The national power scheme, initiated by the legislation of 1926, has naturally taken time to mature, with the result that, on the heavy-plant side of the industry, a period of comparative stagnation set in after the first six months, and is only now beginning to lift. It is evident, however, that the demand for power will, in a short time, overtake supply, unless some effort is made to clear up arrears in power-station plant.

In export markets conditions were satisfactory in the first eight months of the year, but showed a tendency to become less favourable in the remaining four months. The Dominions generally were prosperous. China placed a few orders. Manufacturers improved their position in South America. In South Africa competition from Germany has been very keen, but the British producer has been able to maintain his position without serious difficulty. Europe, Japan, and the Near East were slightly depressed, and placed fewer contracts with Britain than even in 1926.

On the whole, therefore, 1927 must be regarded as a disappointing year: it began well, but ended badly. Yet the international trade situation is much more favourable now than it has been at any time since the conclusion of the war: financial conditions are more normal between country and country, the credit situation is less difficult, and there are prospects of large schemes being initiated as a result of the favourable credit position. In industry, however, there are few signs of any desire to carry out extensive schemes of re-equipment, which are so necessary to competitive efficiency. Coal-mining, iron and steel and textiles have not yet been able to carry out any large reconstruction schemes, and the electrical industry has suffered accordingly. In Germany, and in Switzerland especially, the growth of power finance, accompanied by amalgamations of electrical manufacturers, may introduce complications into export demand within a short time, and intensify the weight of foreign competition in all branches of electrical development. The electrical manufacturers, if they are to survive such competition, must be in a position to work closely and actively together. Co-operation is a vital condition of success both at home and abroad in 1928.

The report proceeds to refer briefly to the Electric Fittings Statutory Committee which is now in permanent session and prepared to hear all accredited representations made to it. Particulars are given of the Fuel Conference that is to be held in London in the autumn. The work of the Economic and Statistical Department, which has had a year of great activity, is summarised.

"The work of co-ordinating statistics has been extremely difficult, but, after three years' active work, the Department has been able to provide fuller and more complete information bearing on marketing, production, international competition, and foreign trade, than is the case with any other basic industry of this country. This has clearly brought out the strong competitive position of the industry, which is more widely discussed among important industrialists, financiers, and large contractors than almost any other industry; and the electrical industry is receiving a higher proportion of inquiries, especially in foreign trade, than the competitive industries in Germany and the United States." The Department has been instrumental in encouraging other countries to issue statistics, with the result that six countries now issue a monthly index of electricity production, which is of value in showing the state of power demand. These countries are Great Britain, Germany, the United States, Canada, Switzerland, and Italy. Both the United States and Germany now publish indices of orders received for electrical machinery, similar to the index published for Great Britain.

The seventh annual report of the E.R.A. states that programmes for research in several directions are being postponed, and may have to be postponed indefinitely, for lack of adequate funds, notwithstanding that expenditure has increased more than tenfold in less than ten years. The Council has had under consideration a report of the Research Committee as to the financial position of the E.R.A. when the Government grant ceases in 1930; the amount that will then be required to carry on research efficiently; and the best method of raising funds individually rather than by block grants.

The Education Committee reports that it was able, from a balance left in the Scholarship Fund, to make final grants-in-aid to four meritorious B.E.A.M.A. scholars. The preparation of the enlarged scheme of scholarship has been retarded by various unforeseen causes. The number of overseas students in members' works at the close of the year 1927 was 158, a decrease of four on the previous year. The countries sending the largest numbers were, in order of importance: India, Africa, Australia, New Zealand, South America, Egypt, British Guiana and West Indies, China, Canada, Tasmania, United States, and Japan. An arrangement has been made under which members have undertaken to accept each year a certain number of properly qualified Indian students, either for full or part-time courses. The Education Committee has taken note of the wider educational activities of the nation.

Reference is made to a recent case which turned upon the construction of the conditions of contract, a clause in which purported, and was believed by the defendants, to exclude consequential damages, but was found not to do so. The Association's solicitor's opinion is that members who incorporate B.E.A.M.A. conditions in their contracts in the manner prescribed would be fully protected in similar circumstances. During the year the maintenance period of twelve months was made an Association rule for all machinery and apparatus for home contracts, with or without erection. The texts of two sets of model conditions of contract for export work, prepared jointly by the Association and the I.E.E., have been published by the Institution. They cover f.o.b. and c.i.f. contracts respectively. The solicitor repeats his warning as to the need for constant watchfulness to ensure that the "Agreement" portion of their contracts is not allowed to override the conditions "annexed thereto." A settlement on a particular contract was reached during the year with the Tyne Commissioners through the Association, which will doubtless be useful in future contracts with that body.

The work of standardisation progressed steadily during the year in the various technical committees of the sections under the guidance and co-ordination of the Committee. The B.E.A.M.A. is represented on approximately one hundred and thirty B.E.S.A. committees, with an average of four representatives per committee. This is in addition to several B.E.A.M.A. committees engaged in the preparation of specifications. The specification defining Methods of Declaring Efficiency, the result of many years' work, was prepared by the Standardisation Committee, and has been adopted without any technical amendment as a British national standard, and accepted by the International Electrotechnical Commission as a basis for an international standard.

The specification for transformers for power and lighting, drafted by the Transformer Technical Committee, was also adopted as a British national standard, and offered to the International Electrotechnical Commission to serve as a basis for the international standardisation of transformers. Work is proceeding on more than twenty different subjects, ranging from the rating of rivers to the measurement of the output of ceiling fans.

At the meetings of the International Electrotechnical Commission at Bellagio, Italy, in September, 1927, the Association was officially represented by the secretary, the chairman of the Standardisation Committee, and twelve delegate members of the Association. The Advisory Committee passed a special vote of thanks to the British Delegation for the very large amount of work done by two members of the Standardisation Committee in connection with the revised draft rules for electrical machinery, tolerances, and methods of declaring efficiency.

The new General Railway Classification and the new standard rates and charges came into operation on January 1st, 1928. The cost of transport to the Association will, on the whole, be very materially less than before, and many thousand pounds

less annually will be paid than if several of the companies' proposals had not been challenged and fought to a finish. Some disappointment may be felt by the reduction of the allowance from the standard rates when goods are carried at owner's risk, but the railway companies produced data to show that the allowances proposed were justified, and in very few cases were their proposals affected by discussion.

The E.L.M.A. applied to the Committee for assistance in obtaining a greater reduction than that proposed by the companies, *viz.*, 5 per cent. for owner's risk; and the Committee prepared a case which resulted in the deduction being doubled. disoussions are still taking place with companies as to the provision of more vehicles adapted to carry heavy pieces of machinery. Whilst certain concessions have been obtained from the shipping companies, the Committee is of opinion that the surcharges on heavy-weight traffic when carried overseas are still excessive, and discussion is proceeding.

The Export Committee has again devoted a very considerable amount of attention to the question of amendments to Dominion and foreign tariffs. The proposed amendments to the Australian tariff have been considered, but there has been no progress in the adoption of specific rates of duty which would ensure that the British manufacturers actually received the preference intended by the tariff. Increased preference has been granted to British manufacturers by New Zealand. Questions have also been dealt with in connection with the French and Rumanian tariffs. The India Overseas Committee is in active discussion with the India Stores Department of reasonable amendments to its conditions. Other matters dealt with by the Export Committee during the year were the proposed Canadian electrical code, handicaps to British trade in Denmark, the post office regulations relating to commercial marks and figures in cablegrams, &c.

Several members have found the "Standard System of Cost Accounting" very useful as a guide in revising their present system.

The E.D.A. report for 1927 is referred to at some length.

The exhibition standing rule provides that members may exhibit at any exhibition if they incur "no expense." It has been decided that the building of exhibition stands (unlike the cost of stall attendance) is an "expense" for the purpose of the rule.

Electricity and Fuel Conservation.

The Author deals with the question of combining the production of electricity with that of coal by-products, and makes a plea for co-operation between mine owners and electrical engineers.

By W. T. TOWNEND.

(*Abstract of a Paper read before the* INSTITUTION OF ELECTRICAL ENGINEERS.)

A STUDY of the Board of Trade returns reveals the fact that the coal industry is far from satisfactory, the exports having fallen steadily from the year 1913 to the year 1925. This condition of affairs should give an impetus to the adoption of every form of power production which will conserve our coal, and greater use should be made of the present known forms of high- and low-temperature carbonisation, which, in addition to producing valuable by-products, including electrical energy, also yield residual fuel and coke for domestic and commercial use.

One of the results of the recent Electricity (Supply) Acts is that the generation of electrical energy is to be no longer a matter of local, but of national importance. The national and individual points of view are divergent, the individual's only concern being to obtain power at the cheapest possible price, whereas the national effort should be to secure the best return from every ton of fuel burnt. The national value of coal is the price which can be obtained for the commodity in the foreign markets, and is estimated at 22s. 6d. per ton.

Waste-heat stations may be divided into four groups: Coke-over gas stations, which derive their power from the waste gas of coking plants employing regenerative ovens; blast-furnace gas stations, where the engines are supplied with waste gas from blast furnaces; waste-heat stations, where recuperative ovens are employed and waste heat in the form of burning gases is fired under specially designed waste-heat boilers; and stations employing gas engines worked from coke-oven gas exhausting into low-pressure exhaust-heated boilers.

The percentage of surplus gas obtained from the regenerative oven is from 50 to 65, against 15 to 30 per cent. in the case of a waste-heat oven. In general practice 1 ton of dry coal carbonised by the high-temperature process yields 14 cwt. of coke, 95 lb. of tar, 3 gal. of benzol, and 30 lb. of ammonium-sulphate, together with smaller quantities of other by-products and some 5 000 to 6,000 cu. ft. of gas, with an average calorific value of 500 B.th.u

In an important colliery group in the Midlands, employing a coke-oven gas station, the average cost per unit generated, taken over a year's working, was 0.125d., and over a month has been as low as 0.118d. in some cases. These figures include wages, repairs, interest on capital and depreciation, on a total output of the order of 50 million units per annum. This station is supplying in bulk to a local undertaking at 0.4d. per h.p. unit, a figure which compares favourably with the anticipated rates for the year 1940 given in the Weir Report.

Experience shows that the addition of a number of electric cookers on the mains of an undertaking results in a decrease in the cost per unit generated, due to improved load factor. Cooking by electricity for a household of four persons at 1¼ units per head per day is equivalent to say, 2,200 units per annum, which, at 1d. per unit, equals £9 3s. per annum; this, when compared with domestic coal at £3 per ton, is equivalent to 3 tons 1 cwt. If the cooking for the same family were done entirely by coal, the annual consumption of fuel would be of the order of 5 tons, or £15 per annum. Once the public realises that electricity provides really the cheapest and cleanest form of cooking, its use will become almost universal. Hot water will however, still be required, and here, therefore, is an outlet for coke; the only question that remains is whether or not this outlet is large enough for the quantity of coke produced. In the year 1924 some 12¾ million tons of coke were produced from coke-oven plant, which quantity was practically all disposed of to steel works, furnaces, and the like. During the same period some 13 million tons of coke were made at gasworks, all of which was absorbed by private householders and stores for general domestic purposes. As in that year electric cooking was practically in its infancy and yet all the gas coke was absorbed, it is reasonable to expect that as electric cooking becomes more popular the demand for coke will become greater.

Metallurgical coke—the result of abstracting all the volatiles from the coal—will not ignite and, therefore, for domestic purposes has to be used in conjunction with ordinary coal. If, however, some 5 to 6 per cent. of the volatiles are left in the coke the result is a soft fuel which will not only burn by itself, but will also ignite in an open hearth.

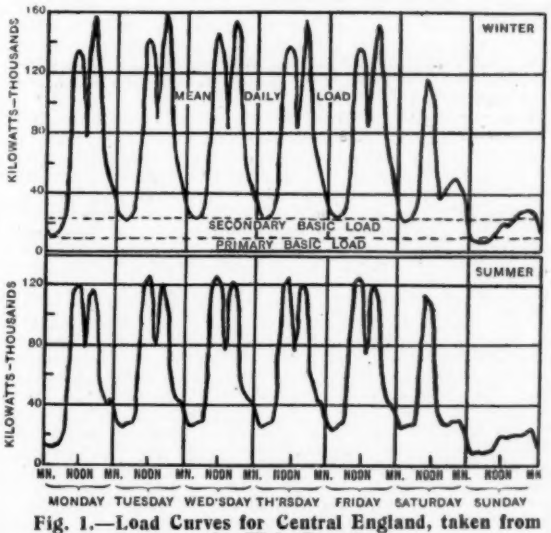

Fig. 1.—Load Curves for Central England, taken from the Weir Report.

If the anticipations with regard to electric cooking are realised, and a great demand for coke is created which cannot be met by the gas companies unless the waste-heat stations attached to the coking plants are encouraged to contribute their quota of surplus electrical energy to the "grid" mains of the country, the increase of utilisable waste-heat created by this larger output of coke will be lost. On the other hand, however, if the colliery and coking-plant owners think that they have only to meet the demand for coke and are to be debarred from disposing of their surplus energy, they may,

on the grounds of financial economy, refuse to increase the capacity of their coking plants, with the result that this country may have to import coke.

The more recent and successful introduction of pulverised fuel is yet another opening for the use of what, up to the present, has been considered to be waste, namely, coal-dust residue, which is the fine coal dust deposited from the washing screens over which the crushed coking coal is passed. This fine coal dust has been found to be very satisfactory for pulverised-fuel firing; it has a calorific value of about 10,000 to 11,000 B.th.u., and is valued at about 8s. per ton at the pithead.

If this fuel were carried by rail to an authorised undertaking the price would be increased by freightage and demand to perhaps 21s. or more.

In the mining districts there is a lack of large quantities of river water, and if, therefore, it is impossible to arrange for the steam station to be erected on the bank of a river, it will be necessary to supply the condensing water from cooling towers and the make-up water from springs, which are usually plentiful in those districts. In the same way the cooling water for the waste-heat stations can be supplied from cooling towers, whilst the quenching water for the coke ovens will be supplied from springs and streams as at present. It is admitted that the gain in thermal efficiency due to the use of river water as compared with artificially cooled water is of the order of 4 to 5 per cent., but is this a material factor in the proposed scheme under consideration?

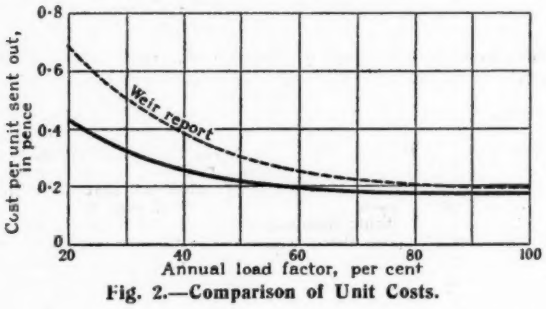

Fig. 2.—Comparison of Unit Costs.

In order to obtain the necessary circulating water for naturally cooled circulating plant and a thermal efficiency of 20 per cent., it may be necessary to erect the station some distance from the coalfields, and so incur freightage charges amounting to, say, 7s. per ton. Under these circumstances the total fuel charges on 337,800 tons at 15s. per ton (8s. plus 7s. freightage) would be some £253,000. If, however, at the pithead a thermal efficiency of only 19 per cent. is obtained, then the total fuel charges on 355,000 tons at 8s. per ton would be £142,000, which shows an annual saving of £111,000 in favour of artificially cooled condensing plant. It should, however, be borne in mind that this increase in fuel consumption is only advisable when the station is running on cheap residual fuels which are of no export value.

There are to-day in Great Britain some 150 coking plants in operation, nearly all of which are part of various colliery equipments or are under the direct control of the coal-owners, and from this it will be realised that the principal source of waste-heat energy is in the hands of the collieries. Generally speaking, however, the colliery companies have refused to consider such proposals on the grounds that it is not policy for them to be loaded up with further capital for mains and plant on which the return is less than that of the companies as mining concerns.

The difference between the two types of undertakings, *viz.*, the authorised and the unauthorised, is that the first is supplying under its Provisional Order, and is subject therefore to certain regulations and penalties, whilst the second is really a private station which may dispose of its surplus energy into the "grid" mains, or to an authorised undertaking. Over the first the Central Electricity Board has full control, but over the second it can only exercise such control as may form part of an agreement between it and the private undertaking, and, unfortunately, the 1926 Act does not help in this direction. This fact leaves the purchase of surplus energy in a nebulous state. It can only, as far as waste-heat stations are concerned, be purchased from unauthorised undertakings under agreements which are bound to vary according to the attitude adopted by the various companies, and may in times of stress be the subject of negotiations and, perhaps, even lawsuits.

It will be realised that a supply from a statutory company is no more secure than one from a non-statutory waste-heat company, as neither legal agreements nor legislation can compel an undertaking to supply electrical energy when there is neither fuel nor labour available. A study of the problem on these lines leads one to the conclusion that different types of generating plant possess distinct qualifying characteristics, and that if these are to be utilised to the fullest advantage the real solution lies in co-ordination and not in concentration.

An examination of the Weir Report leads one to conclude that the authorities intend to adopt, for the generation of electricity in this country, the usually accepted power-station practice of running one set all the week round for the basic load, another set for the mean daily load, and a third for the peak loads. Based on this principle, the following suggestions are put forward for supplying the large industrial area of Central England.

This area gives a maximum winter demand of 160,000 kW and a minimum of 10,000 kW, whilst the summer maximum and minimum are 125,000 kW and 10,000 kW, respectively, the total units sent out being of the order of 598 millions. To deal with this demand it is proposed to use waste-heat and pulverised-fuel stations, and in order to take advantage of the special characteristics of these various types of plant the load has been divided up into the following stages (see fig. 1):—

	Maximum demand. KW.	Station load factor. Per cent.
Primary basic load	10,000	100
Secondary basic load ...	22,000	84
Mean daily load	155,000	36.3

The units generated and sent out for each stage will be:—

	Units generated.	Units sent out.
Primary basic load	95,400,000	87,600,000
Secondary basic load ...	96,100,000	88,200,000
Mean daily load	467,000,000	423,000,000
Total	658,500,000	598,800,000

By virtue of the fact that a waste-heat station requires a 100 per cent. load factor on the coke ovens to ensure economical working, and that the storage of surplus gas in large quantities is a costly business, it is proposed that the primary and secondary basic loads shall be dealt with by such stations equipped with gas engines giving an overall thermal efficiency of the order of 26 per cent. In order to save fuel these engines would be fitted with exhaust-heated boilers supplying steam to the stills and other steam-using plant. As the resultant coke would have to be for a mixed market, domestic and commercial, it is proposed to use taper silica ovens giving a high through-put rate, flexibility and an evenly carbonised coal. These would be divided into banks, those on the primary basic load producing metallurgical coke, and those on the secondary basic load domestic coke. The mean daily load is to be dealt with by steam-turbine stations, operating on the residual coal and slack dust from the coke ovens, which can be transferred from the crushing and washing plants to the stations by means of pipe lines or conveyor gear.

In order to save banking losses and waste of coke-oven gas over the week-ends, when the load is low, it is proposed to bank the boilers by means of coke-oven gas transferred from the secondary basic-load plants. It is assumed that all these stations (mean daily load and secondary basic load) will be the property of the same company or companies, and that the surplus gas so transferred will only be charged at a nominal sum representing the interest and sinking fund charges on the special pipe line for that particular purpose.

Obviously, from the national point of view, it is more economical to utilise the surplus gas in this way over week-ends, as this method maintains a high through-put rate on the coke ovens, which is, of course, conducive to efficiency and economy, and at the same time saves the coal that would otherwise be consumed for banking purposes only.

If, on the one hand, the mean daily load demand had been taken by a station burning steam coal, some 337,800 tons of this fuel would have been used, at a national value of £379,000, and under this heading there is therefore a direct financial saving of £243,900, added to which, of course, the nation has conserved this quantity of coal. On the other hand, however, some 998,200 tons of coal valued at £449,200 have been carbonised, which, in addition to producing some 176,000,000 units, have also produced by-products to the value of £875,000. The average price per unit sent out is 0.248d., as against the figure of 0.345d. given in the Weir Report, a saving of 0.097d. per unit, or a total saving of £242,000 in respect of this item (see fig. 2). The total savings affected by this scheme amount, therefore, to £242,000 in respect of the unit, and £243,900 of steam coal, in addition to which the figure of £875,593 for by-products should also be placed to the credit side of the account.

It will be appreciated that the success of such a scheme as this depends upon three factors—(1) an ample supply of cheap residual fuels, (2) an assured outlet for the various by-products produced by the waste-heat stations, and (3) an adequate demand to absorb all the electrical energy. If the price is right and the area under discussion is energetically canvassed, there can be little or no doubt that the outlet for electricity will be assured. The other two factors are, however, more difficult, as it can be taken for granted that the various colliery and waste-heat companies will not entertain the necessary capital outlay unless they are assured of a market for both their residual fuels and their by-products, and here the Government could help.

It is already proposed to guarantee the electricity industry to the extent of £25,000,000 for providing the necessary interconnecting trunk transmission mains, and if the estimated direct saving of £485,900, plus the additional income of £875,000 from by-products in this area alone is worth having, the subsidy should not end here, but a part of it should be utilised to guarantee to the colliery and waste-heat companies feeding into the "grid" mains the interest on the additional capital required for the coking plants and generating sets necessary for the public supply.

If some such steps as these be not taken we may arrive at a time when, due to cheap electricity and the wholesale development of electric cooking, the resultant demand for coke for water-heating stoves may be such that it cannot be met by the gas companies. It will not be met by the coking or colliery companies, owing to lack of guarantees for capital on their plant or of outlets for by-products; the only course then open to the country would be to import this commodity, and this would not be in its interests.

Discussion in London.

Mr. W. B. Woodhouse, in opening the discussion, queried the author's figure of 22s. 6d. as the price per ton of coal in the foreign markets, and also that of 10,000-11,000 B.th.u. per lb. as the calorific value of coal-dust residue. Referring to the prices given for this fuel at the pit head and at the bunker, 3s. and 21s. respectively, he thought that if there was really all this difference, water-heating would be a very profitable thing. 7s. per ton for freightage, he thought, could not be justified. The author had suggested that the owners would sell at a very cheap rate; but the price of a thing was what people would pay for it. His considerable experience with coke-oven gas was that it could not be obtained free of cost. The cost of fuel was not a very important question if one considered that in this country some stations had to pay more for rents than fuel. If we could be sure of the three fundamentals given for the scheme in the paper, it might prove workable, but the market for by-products was a very variable thing. Before the war we were seriously concerned with conserving coal—now the difficulty was to sell it. It was not his experience that the coal owners were unsympathic towards development. It should be remembered that from the owners point of view the electrical industry was one market, and a comparatively small one. The waste heat idea was attractive, but it was a false one. From the engineers' standpoint, to have a large balance of heat from a blast furnace was not a sound proposition, and it was a fact that steps were being taken to avoid such waste. There was no technical difficulty in carbonising coal, but there was a big commercial one; the solid fuel obtained would have to be sold at a higher figure than was originally paid for the coal. To-day there were prospects of getting oil from coal without carbonisation, and there was no justification for combining generation with carbonisation. The idea of using low-grade coal for pulverisation was another attractive one; but other countries apparently found it paid to pulverise clean coal. It was established that the cost of pulverisation increased the dirtier the coal. His conclusion was that the present principle of establishing large central stations was the right one.

Mr. S. J. Watson said that the paper would lead one to believe that the low-temperature carbonisation process was a complete success, but that was hardly the case. The chairman of the Gas Light and Coke Co. had stated that the conclusion from investigations in America was that the process was not successful. He did not think that the idea of national and individual differences was acceptable—the two interests ran together. With regard to the use of coke, he was convinced that the use of slow-combustion stoves would increase, and hence the demand for coke. He also could not understand the figures given by the author for the calorific value of dump fuel, as slurry usually contained 50 per cent. moisture and 30 per cent. ash. It was quite wrong to base conclusions upon such figures. With regard to the waste-fuel-for-nothing idea, the N.E. Coast manufacturers would not be satisfied to know that they were putting 186 million units into the supply network for nothing. In most cases there was usually a compensating agreement between the manufacturer and the supply undertaking. The absence of natural cooling water would prevent the development of big stations at the pit heads. Further, coal seams worked out after a time, and in one case it was found that it paid to get coal from other pits. He thought it was yet to be demonstrated that pulverised-fuel firing was better than other methods. Again, with regard to dump fuel, the supply must be limited as soon as the accumulated stocks were used, and the prices would go up with the demand.

Mr. J. G. Griffin made a plea for the increased use of Diesel engines, which could take a large part of the national load. With regard to the scheme in question, if four Diesels totalling 30,000 kW were installed, the capital charges would amount to £1.28 per kW, against the Central Board's figure of £3.8 for turbines, which, considering other factors, would result in £2 10s. in favour of the Diesels. Further, the advantages in having separate units which could be started up and put on load instantly were very large.

Mr. A. Mallinson discountenanced the suggestion that 1,000 tons of slurry could be obtained from one colliery per day. In North Staffordshire a scheme which was started in 1910 to use up the colliery rubbish resulted in utter failure, and they had eventually to buy low-grade fuel from other collieries.

Mr. J. Godber, as one associated with coal distillation, said that although he could not agree with the suggestion of getting waste heat for nothing, he welcomed the idea behind the paper of making the utmost use of our coal. The high-temperature oven must continue in order to obtain metallurgical coke. Even if the suggestions put forward were developed, the gas industry would soon cry out about the supply of gas at an uneconomic rate. Such a scheme as the author had put forward was in existence—but could it be extended? It would need Government support, and that, he thought, would condemn it.

Prof. W. Cramp complained that the author had not left his suggestions clear as regards the position of the power stations. Either the stations would have to be at the pitheads, equipped with cooling towers, or the gas would have to be transported. He pointed out that the primary and secondary basic loads were not of a suitable nature to be dealt with by gas engines. Had the author any idea of the number of cylinders that would be required for 30,000 h.p. of gas engines? With regard to the supply of coke to houses, to supply 50 gal. of water at 70 deg. F., with coke at 39s. per ton, would cost 4.67d.; the cost of heating the water electrically, based on the Glasgow electricity charges, would be 5d. The margin was too narrow to warrant the use of coke. The author proposed to sell the soft coke—but metallurgical coke was much better.

Mr. G. W. Partridge said that the deciding factor as regards locating the stations at the pitheads was the question of continuity of supply. To have a large station dependent on one mine and one body of miners would be a mistake. In view of the other and more serious factors involved in the modern station, so long as the efficiency was reasonable it was good enough. He thought that pulverised-fuel firing would not be a success near towns because of the dust difficulty. A limiting feature of the author's scheme would be that the by-products would have to drop in price as the result of competition.

Dr. Parker Smith felt that it would not make very much difference if stations got their fuel for nothing. In one case the fuel costs were only 14 per cent. of the total. The storage idea was the one along which we should have to progress, and we must study the question of storage during off-peak load. He denied a suggestion that it was necessary to have a stove in which to burn rubbish; the all-electric house produced less rubbish than the ordinary house.

Mr. A. H. Dykes defended the paper on several points that had been criticised. Referring to Dr. Cramp's condemnation of the coke-stove suggestions, he pointed out that electricity at the Glasgow rates could not be obtained everywhere. The waste-heat-for-nothing idea should not be taken too literally: at the present time there were tremendous quantities of gas being thrown away, and if these could be utilised there must be a saving somewhere in the nation. He knew of one instance in the North where there had been a change-over from turbines to gas plant with financial advantage. It was not intended to put each station at a separate pithead, but in the centre of a group of pits. The main issue of the paper was to consider the possibilities of combining the sale of coke and the generation of electricity, and he thought the paper was valuable in ventilating the subject.

It was intimated that Mr. W. T. Townend would communicate his reply to the discussion to the Institution *Journal*.

Parliamentary News.

(By Our Special Parliamentary Reporter.)

Wireless Beacons.

On March 20th Sir R. Thomas asked the President of the Board of Trade if he would state what developments had taken place up to the present in the installation of wireless beacons round our coast; and how the costs of establishment and upkeep compared with those of lighthouses.

Sir P. Cunliffe-Lister said that two wireless beacons were now in operation, at Round Island, Scilly, and at Skerries, off the coast of Anglesea, while three, at Caskets, Lundy, and Start, were in course of erection and were expected to be in operation in a few months' time. Several more were projected. He was informed by Trinity House that the first cost of a wireless beacon installation at an existing lighthouse was from £3,500 to £4,500, depending on local conditions, and the estimated cost of maintenance £300 per annum. If a wireless beacon were installed at a place where there was not already a lighthouse, the cost of establishment would be much greater, and the cost of maintenance would be increased to approximately £1,000 per annum.

The Cable-Wireless Merger.

On March 22nd, in reply to a number of questions, Mr. Baldwin, the Prime Minister, said that the Government and the Imperial Wireless and Cable Conference had no previous knowledge of the details of and had no responsibility for any financial arrangements for the merging of the Eastern Telegraph and Associated Companies and the Marconi Company. As regarded the general question, he could make no statement in advance of reports from the Imperial Conference, which, only on March 19th, received a proposal from the companies concerned. But, since members had specifically inquired as to the attitude of the Government, he thought it right to say that the Government, while it was prepared to join in discussing measures for a working arrangement, was not committed even in principle, and reserved freedom of action with regard to any proposals for transfer of the operation and control of the Imperial wireless services at present administered by the Government.

The "Electromersible" Pump.

By utilising the motor rotor as the actual water impeller, the inventor has secured advantages owing to the absence of the usual glands.

AMONGST the present demands for specialised electrical machinery for meeting exceptional requirements are motors of the immersible type for combining with centrifugal pumps. It is often desirable to place the pump and motor in a position in which it may frequently get submerged, or it is sometimes more convenient to lower the pump and motor right into the water so as to obviate priming, foot valves, or a long suction pipe.

For this special work a recent design of machine is the "Electromersible" pump made by Messrs. J. Samuel White and Co., Ltd., under licence in accordance with the patents of Mr. T. L. Reed-Cooper, M.I.Mech.E., and we understand that this type of pump has been adopted by the British Admiralty, and is in use for auxiliary services on H.M.S.'s *Nelson* and *Rodney*. In these cases the pumps have to comply with exacting conditions of size and weight, for output. The output per pump is specified at 100 tons per hour against a 75-ft. head, or against any head down to free delivery on deck without overloading the motor; and to operate equally well above water as when submerged 40 feet, and under all conditions without any adjustment. On tests the pumps proved capable of giving a continuous output of 125 tons per hour against 75 feet, the motor power factor was .91, and on the continuous full-load test run the temperature rise did not exceed 55 deg. F.

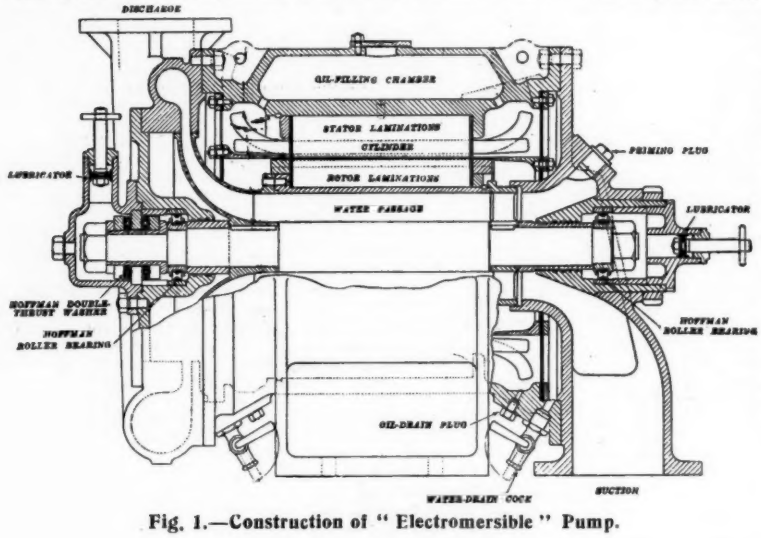

Fig. 1.—Construction of "Electromersible" Pump.

The machine consists of a 3-phase squirrel-cage motor combined with a centrifugal pump, the rotor of which runs in the water. The stator core and windings are protected with a water-tight non-corrodible enclosure which is filled with transformer oil; the oil forms a good cooling medium, and also prevents condensation of atmospheric moisture in the winding enclosure. As shown in fig. 1, the water enters the suction at one end of the motor and passes through an annular space in the rotor which is joined to the impeller. The shaft therefore runs freely between the two end bearings without requiring any glands, and the leakage water round the periphery of the impeller fills up the space around the stator winding enclosure and is drawn into the suction again at the running clearance of the rotor at the opposite end, thereby forming a very efficient cooling circulation when the motor is working above water. The oil- and water-tight enclosure is of a special alloy, and is entirely stationary. The stator laminations are thus protected from corrosion, and the windings are suitably cotton-covered, insulated and varnished to suit oil immersion.

The water is led in by means of screw vanes at the intake end, whereby a rotary motion with pressure is gradually imparted to it, thus reducing the shock in meeting the impeller blades. The revolving element, consisting of the shaft, impeller, rotor, bearings and housings, can be easily removed, without breaking the joints of the suction and delivery connections to the pump casing, by unbolting the cover at the impeller end and unscrewing the nut on the bearing housing at the suction end, so that the working parts of the pump can be easily and quickly examined and dried out after use, if desired. The outer casing of the machine forms a completely air-tight enclosure.

The connecting leads from the windings are taken through patent oil- and water-tight plug-and-socket connections on the frame of the motor; c.t.s. cable is usually employed. Similar water-tight couplings are also supplied for additional lengths of cable when required. The pumps are fitted with suitable lifting gear, and in some cases are also fitted with wheels to facilitate transport. It is claimed that the machines cannot be put out of alignment in handling, and that, owing to the rigid construction of the rotor and impeller, the shaft is only required as a tie-rod holding the parts which are spigoted together, as shown in fig. 1.

The bearings are easily accessible at the ends of the shaft, and no centre bearing is required.

Fig. 2 shows a 100-ton "Electromersible" pump outfit, including a foot valve which fits either on the pump suction or the hose, as required, and a motor alternator for converting the supply to 3-phase a.c. with a starting switch mounted on it for running the whole up together from the d.c. side.

The suction and discharge branches are fitted with hose couplings of the patentee's special design to secure a tight joint, even should the gasket get damaged or lost.

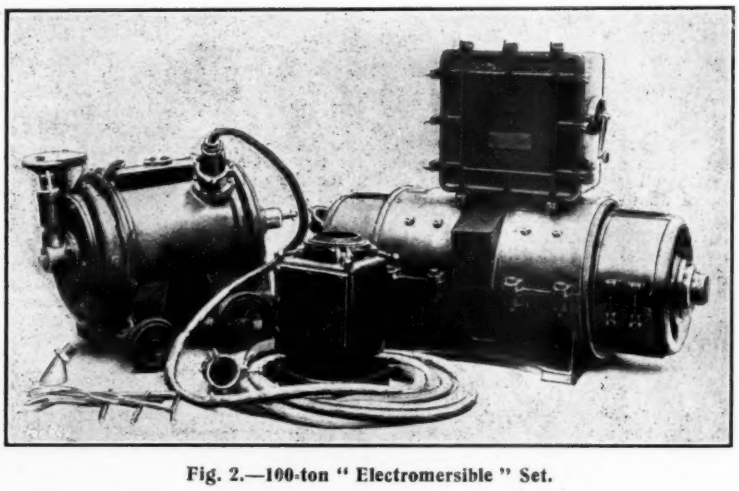

Fig. 2.—100-ton "Electromersible" Set.

The University of Sydney.

The Senate of the University of Sydney has issued an appeal for funds, aggregating £250,000, to enable it to maintain the standard of efficiency which it reached before the value of money depreciated, leading to retrenchment which hampers its activities and to an increasing annual deficit. The fees of students have been raised, but this tends to shut out the poorer ones; the teaching staff is undermanned and overworked, and research is restricted.

The appeal should meet with a hearty response from old students of the University and other friends of the first Colonial University in the British Empire. The organising secretary is Mr. E. F. Campbell, Professor of Electrical Engineering in the Peter Nicol Russell School of Engineering of the University, and formerly of London. We understand that gifts in kind would be welcomed if cash is not available, and we commend the matter to the notice of engineering firms in view of the importance of familiarising the rising generation with the merits of British-made machinery and apparatus at a most impressionable period of their training.

Talking Motion Pictures.

Some notes on a method of obtaining synchronism between the sound-producing and film-projecting apparatus.

By WILLIAM H. BRISTOL.

(*Abstract of a paper printed in the Journal of the* FRANKLIN INSTITUTE.)

AT the present time there are two general types of synchronised motion pictures in use—one using a phonograph disk for recording the sound, and the other photographically recording the sound on the edge of the film. The paper presents in condensed form the development of the author's method of making and reproducing such pictures, which is of the former class. It was soon realised that acoustic recording for talking pictures, with a horn, would be impracticable, because the person to be recorded would have to be very close to the horn in order to register, and the horn could not be concealed in the picture.

The electrical recording system, consisting of a high-quality microphone and amplifier apparatus, became available when the vacuum tube was perfected. The use of the microphone and amplifier allows for more latitude than the older system of horn recording, as well as affording a method of reproduction of a superior and more natural quality of the sound.

The synchronising system which has been developed for driving the camera and the recording machine, and also for reproducing the sound record with the motion picture, consists of two special synchronisers, one of which generates the electrical energy in its field circuit to feed the field of the other. The rotating armatures of both synchronisers are energised from an a.c. line. When the armature of one of the synchronisers is turned by an outside source of power, the armature of the other runs in synchronism. Torque is developed from rest with these machines, thus making it possible to transmit power electrically from one synchroniser to the other, and with perfect synchronism.

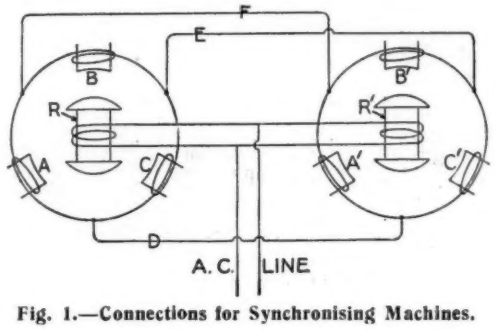

Fig. 1.—Connections for Synchronising Machines.

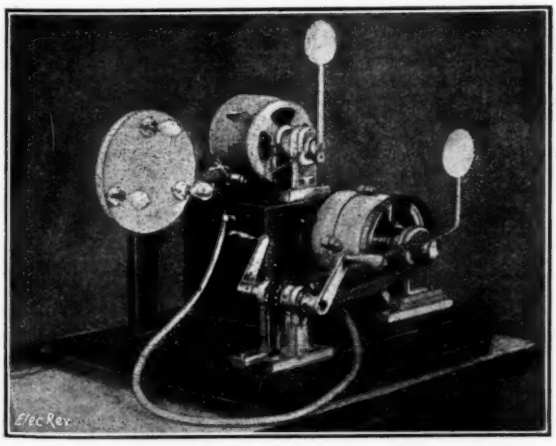

Fig. 2.—Working Model of Synchronising Apparatus.

Having recorded synchronously the sound on a phonograph record and the action on a motion-picture film, the next problem was the reproduction of the picture on the screen in perfect synchronism with the sound of the record. In other words, the turn-table which rotates the sound record must be run absolutely synchronously with the motion picture projector.

It was realised that the reproduction of the sound must be electrical in character, with a loud-speaking telephone near the screen, and with the turn-table located in the booth, by the projector, for the convenience of the operator. A carbon-granule phonograph reproducer was made, using a battery for energising the carbon granules, which afforded a very simple electrical reproducer without vacuum-tube amplification; but inherent limitations in the carbon-granule device have resulted in a further development of a high-quality electromagnetic pick-up. An amplifier and loud speaker have also been developed to complete the sound-reproducing system.

In the exhibition of the pictures the film is started at a marked point at the beginning of the film, and the reproducing needle is engaged in the beginning of the first groove, this groove being eccentric and easy to locate. When the complete apparatus is set into operation, the picture and sound are in perfect synchronism and remain so throughout the length of the film record.

In order to provide against errors that might be made in making repairs of the film, in locating the starting-point of the film, or in setting the needle on the starting-point of the record, a unique re-synchronising method has been devised by means of which the film may be advanced or retarded with respect to the sound record, even during the projection of the pictures, without affecting the quality of the sound reproduction. This is accomplished by mounting the field-winding frame of one of the synchronisers in trunnion bearings within which the armature bearings are located, thus allowing the field frame of one of the synchronisers to be rotated with reference to its armature, independently of the rotation of the armature. When one of the armatures is revolved at a given speed, its speed with reference to its field can be changed by rotating manually the field frame in its trunnion bearings. Ordinarily, when transmitting power from one of the synchronisers to the other, the field frames are stationary, and the speed of the second armature will be the same as that of the first. If the field frame of the first synchroniser is rotated, the speed of the second armature will be the same as the new speed of the first armature relative to its field, and not the *actual* speed of the first armature. A striking feature of the working of the two synchronisers is that their action is not affected by considerable variation of the voltage, or of the frequency, at which the rotors are energised.

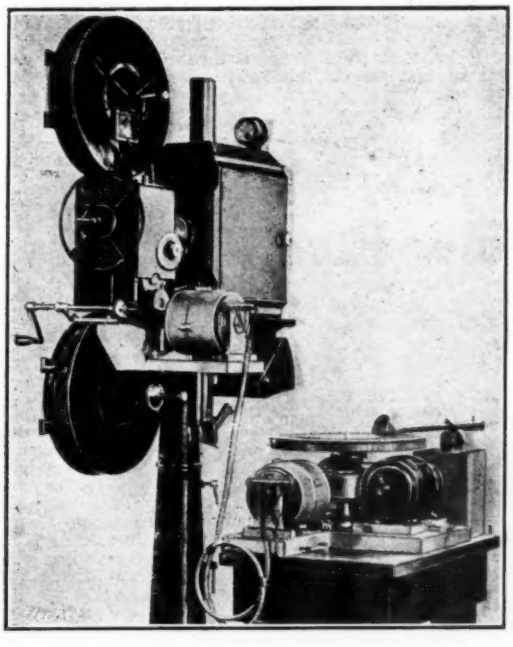

Fig. 3.—Complete Projector and Sound Apparatus.

Fig. 1 is a diagrammatic representation of two synchronisers. The rotors, or armatures, R and R′, are fed from the alternating-current line as indicated, while the field windings, A, B, C and A′, B′, C′ are interconnected by the wires D, E, and F. The working model shown in fig. 2 has been made to demonstrate the principles of the synchronisers and the method of re-synchronisation. Two synchronisers are connected by a small cable containing five wires for the interconnections

shown in fig. 1. The rotor of the front synchroniser can be hand revolved in either direction by the chain drive, while its field may be rotated in either direction by the rear handle. Each armature is provided with a pointer so shaped that the armature motion may be easily followed. Upon switching on the supply to the armatures there will generally be a motion of one or both of the armatures, bringing them into magnetic equilibrium. If the armature of the front synchroniser is now revolved in either direction, the armature of the rear machine will follow in step at all speeds. On the disk at the left are mounted three small incandescent lamps connected across at the three equidistant points of the fields, which show by their increasing and decreasing brilliancy the varying induced voltages generated in the three field sections. To retard the armature of the rear synchroniser, the field of the front synchroniser is revolved by the rear handle in the same direction that the armature is moving; the pointers will continue to revolve at the same speed, but angularly separated.

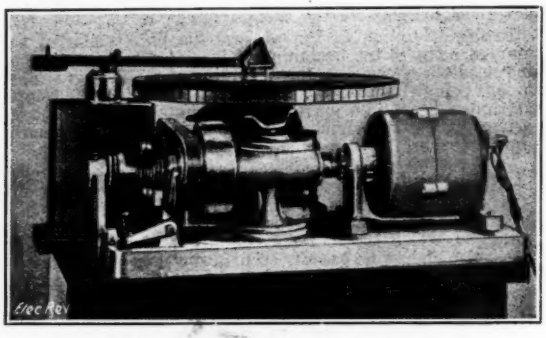

Fig. 4.—Universal Turn-table Unit.

In fig. 3 a motion-picture projector for the standard-width film is shown with the synchroniser attached for driving it with its re-synchronising handle at the left. On the right is the turn-table on which the record is placed, and beneath this is the second synchroniser. The motor on the right drives the turn-table and also the armature of the turn-table synchroniser, which, in turn, drives the armature of the projector synchroniser.

Fig. 4 shows a universal turn-table unit suitable for use with all types of projectors; the governor, which, it is claimed, maintains absolutely constant speed, is also depicted.

The sound-reproducing system consists of three parts, the electrical pick-up, an amplifier, and a loud-speaker. The function of the pick-up is to convert the mechanical undulations of the phonograph-record groove into corresponding electrical oscillations. Any of the well-known principles used for microphone or loud-speaking devices might be adapted for this purpose, but the electromagnetic principle was selected because of its adaptability to light vibrating parts, its simplicity and ruggedness, and because, with proper design, a high degree of accuracy of reproduction is possible.

The construction of the pick-up is shown in fig. 5. The armature A is supported by the torsion-suspension T, so as to be held equi-distant from the pole pieces P. The needle is secured to the armature by the set-screw S, and movements of the needle displace the armature around the torsional

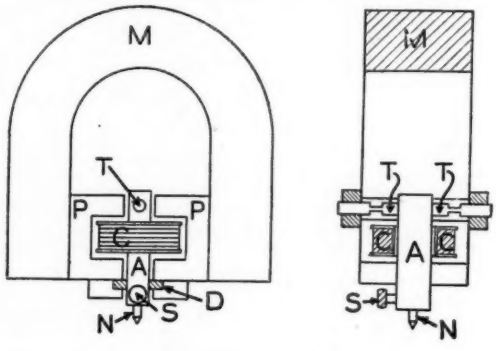

Fig. 5.—Construction of Pick-up.

axis *T*, increasing and decreasing the gaps between it and the lower pole pieces, thus changing the magnetic flux in the armature. There is practically no motion of the armature in the upper gaps, the lower gaps being the active ones. The rubber pads D furnish damping for the armature. A main feature of the construction of this pick-up is its ruggedness and reliability, as the armature is maintained exactly centrally between the pole pieces by the torsion suspension T.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this Section.

A New Rectifier Valve.

A recent introduction of Messrs. Philips Lamps, Ltd., 145, Charing Cross Road, W.C.2, is the "Metalix" high-tension rectifying valve, fig. 1, which has been specially designed for use with cable-testing apparatus, or high-potential generators for X-ray work. Whilst capable of withstanding a maximum reverse peak voltage of 130 kV on a resistance load, or 65 kV (peak) on a capacity load, with a maximum anode current of 200 mA, the dimensions of the new valve are extremely small; it has an overall length of 23 in. and is 3 in. in diameter. The body of the valve consists of a cylinder of chromium-iron which entirely encloses the electrodes. To this central metal portion are directly sealed two glass cylinders forming the necessary insulation. A jacket of bakelite surrounds the glass portion, protecting it from mechanical damage. The following advantages are claimed for the "Metalix" rectifier over the more orthodox types: Greater mechanical strength; small dimensions; easy transportation; total absence of filament glare; and no possibility of X-ray emission.

Fig. 1.—"Metalix" Rectifier Valve.

A Lamp-storage Bin.

To facilitate the stocking and display of Osram automobile lamps the General Electric Co., Ltd., Magnet House, Kingsway, W.C.2, has introduced a steel storage bin and display cabinet. It has a capacity for 374 of the lamps, and is attractively finished in dark-green enamel with the words Osram Automobile Lamps across the front. It is equipped with a hasp for a padlock, and a chart giving particulars and prices of the complete range of the lamps. The dimensions are 14 in. high by 16 in. wide and 10½ in. deep. The interior is so arranged that different types of lamps can be stored by themselves, thus preventing stocks becoming mixed. Each bin is fireproof and is fitted with a drop front, which permits of easy access. Fixing to a wall or counter can be accomplished by means of screws. An Osram automobile-lamp testing outfit is also available for use in conjunction with the bin.

A New Electric Iron.

The "Universal Super-Automatic" electric iron, fig. 2, recently introduced by Messrs. L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, Kingsway, W.C.2, has some interesting features. If left unattended with the current on an automatic thermostatic switch cuts it out of circuit when the temperature safety-margin is reached. Further, the heat may be regulated to meet the requirements of the fabric which it is desired to iron, "finger tip" controls being conveniently placed for operation by the second finger or thumb. Apart from the usual taper point and bevelled edges, the iron possesses the "Universal" rounded heel, so that ironing can be done backwards and sideways as easily and smoothly as it can forward. The apparatus is supplied complete with 6 feet of flexible cord, a connector, and a b.c. adaptor.

Fig. 2.—Thermostat-controlled Iron.

A New Pear Switch.

Fig. 3 illustrates the construction of the "Jacelite," a very neat little pear switch which has recently been introduced by Messrs. J. A. CRABTREE & Co., LTD., Lincoln Works, Walsall. "Jacelite" plates have been used in the switch base to give a sound mounting for the contacts and terminals.

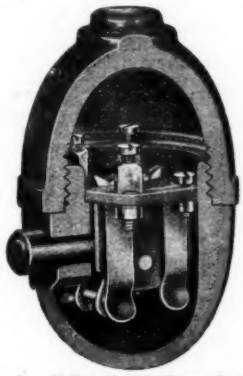

Fig. 3.—"Jacelite" Pear Switch.

While the switch unit fits snugly in the bottom part of the case the top portion allows for a generous amount of slack. A simple but effective cord grip is provided by means of a fibre ring through and round which the leads are threaded. The device may be used as either a one-way or two-way switch.

A Portable Electric Grinder.

The WESTMINSTER TOOL & ELECTRIC CO., LTD., Westool Works, Putney Bridge Road, S.W.15, has recently brought out a new electrically driven portable flexible-shaft grinder, fig. 4. The motor and starter are carried on a convenient trolley, fitted with solid-rubber wheels, and the outfit embodies a new self-aligning handle which, it is claimed, eliminates the trouble experienced with the rigid handle at the junction of the flexible shaft. Further, as the operator can move the handle freely in any direction, the shaft does not drag on the handle and unhampered control of the tool is obtained. The motor can be supplied for any standard voltage, and the flexible shaft in lengths to suit the requirements.

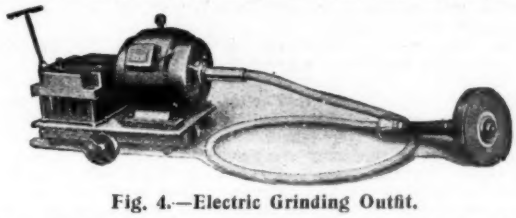

Fig. 4.—Electric Grinding Outfit.

The outfit is made in three sizes, with motors of ¼, 1, and 1½ b.h.p. for 6-, 8-, and 10-in. grinding wheels respectively.

A Cream-making Machine.

An interesting addition to the electrical domestic appliances produced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, is a neat and efficient little cream-making machine, the "Cona," fig. 5. It consists of a container in which an emulsifier is driven at a high speed by a small motor. The emulsifier reconstructs cream from butter and dried skim milk. One pound of butter, seven teaspoonfuls of dried milk, and a pint of boiling water, will, it is claimed, make two pints of excellent cream at a cost of only 2s.

Fig. 5.—The "Cona" Cream Maker.

The Inland Telegraph Service.

Report of the Postmaster-General's Committee of Inquiry.—*Abstract.*

THE Committee, consisting of Sir S. Hardman Lever, Lord Ashfield, and Sir Harry Duncan McGowan, appointed in 1927 by the Postmaster-General "to examine the possibility of effecting substantial economies in the working by the State of the inland telegraph service," &c., has issued its report,* indicating that it is not satisfied that the present service gives the speed which is essential. The fact that the telegraph service has come to be regarded as a diminishing business has introduced an atmosphere of inertia, and the resiliency which should be found in a progressive business is lacking. The Committee is of opinion that the present deficit can be attributed to a considerable extent to the foregoing causes, coupled with the factors of Civil Service conditions, redundancy of staff, rotation of duties and grading of work.

For the financial year 1926-27 the total expenditure (£4,714,009) exceeded the income by £1,571,131, or 7.58 pence per telegram sent. The cost of administration, management, and supervision amounts to about £767,000, and seems high when compared with the operating cost of about £2,166,000.

The inland telegraph traffic is in the unfortunate position of showing a steady decline, and this carries with it a diminution in the number of fresh recruits and in consequence a rise in the average age of the manipulative staff employed. A telegraphist has little incentive, as promotion does not generally come till he is about 45 years of age; in theory he has outlets, but in practice few telegraphists rise beyond their original position. The maximum efficiency of a telegraphist is reached at a comparatively early age after about four or five years' work, and by the time he has reached 35 the monotony of the work, the mechanical nature of operating, and the lack of incentive tend to produce slackness. So far as mere skill is concerned, there is probably no marked decline until the telegraphist is in his 50's, but, as he gets older, it is probable that keen supervision is required to get the best work out of him. Being subject to the general conditions of Civil Service employment, it is rare for a telegraphist to be dismissed, or even to have his pay reduced, for slackness and inefficiency as opposed to misconduct; moreover, even in cases of definite misconduct for which reduction in pay or dismissal may be enforced, the staff has and uses extensive opportunities of appealing. The Committee is of opinion that the right of appeal should be definitely restricted and that the Postmaster should have a more effective control over his staff. Much the same applies to the supervising force; the Post Office has allowed seniority to enter far too much into the question of promotion; closer control should be kept over the authorised establishment and revisions of staff should be effected at shorter intervals; a reduction of the number of supervising officers is necessary; much of the work should be down-graded; and the present rotation of duties is excessive and should be curtailed.

It is difficult for the Committee to express in figures what savings might be effected with an efficient staff and management; but in the course of the inquiry evidence was given by practical telegraph men that on the assumption of a free hand as in a commercial enterprise, and with a wider use of machine printing telegraphs, savings varying from 20 to 33⅓ per cent. of the present operating staff costs could probably be made, and the Committee sees no reason to disagree with this view. Many of the subsidiary duties could probably be carried out quite efficiently by staff of lower grades; for instance, some work which is at present done by female telegraphists at many offices could be done equally well by girl probationers; similarly, some of the work might be done by women instead of by men. The "Walk" system, under which telegrams are sent out in batches, the delivery area being divided into definite "Walks," and the normal interval between dispatches being 10 minutes, is claimed by the Post Office to be on the whole more regular and efficient than the old system and to permit more economical use of the messenger force. On the other hand, both the Federation of Post Office Supervising Officers and the

* H.M. Stationery Office, Cmd. 3,058. Price 6d. net.

Union of Post Office Workers suggested that the "Walk" system had increased delay. Speed is vital to the telegraph service, and the Committee thinks this point is worth a careful and detailed inquiry.

The Engineering Department is responsible for the construction and maintenance of plant, and the Committee feels confident that the services of a first-class engineer with administrative experience would be of advantage to the Department. The Committee thinks that economies would result from a freer use of the telephone trunk circuits for the disposal of telegrams during the less busy hours, and considers that the Telegraph Service should be debited only with the operating charges in cases where existing trunk circuits can carry the additional traffic without serious inconvenience. The P.O. policy envisages the possibility of the gradual supersession of Morse working, but has not hitherto regarded its complete abolition as likely within a measurable period of time. The Committee thinks that a definite speeding-up of the process would be advantageous; it noted many different types of apparatus in daily use and cannot help thinking that concentration on fewer types would increase the efficiency of the service.

Dealing with revenue, a deficit would probably remain under the present tariff even under business management if the inland telegraph service is considered by itself, and under Post Office management, hampered by Civil Service conditions with an established staff, the deficit must be substantial. In the last pre-war year, 1913-14, there were about 69,700,000 inland telegrams, excluding telegrams to, from, or within, the Irish Free State. During the war the traffic fell, but after the armistice it rose steadily, a total of about 77,000,000 being reached in 1919-20. In 1920 the Press tariff was raised by 25 per cent. and the ordinary tariff was raised to the present rate of 1s. for 12 words and since then the number of telegrams has steadily declined, until in 1926-27 there were only 47,400,000 telegrams, the annual decrease varying between two and two and a-half millions in recent years. The increase in tariff in 1920 cannot be held responsible for the continuous decline since 1921 to the present day: the explanation is to be found partly in trade depression, but mainly in the competition of the telephone service, which tends to kill short-distance telegraph traffic; the average distance of the inland telegram has steadily risen, and it now stands at about 160 miles. With the growth to be expected in the telephone habit, which should be encouraged, this decline will continue.

The Committee does not consider that there is any scope for a special service of "urgent" telegrams in this country, neither can it recommend a tariff based on zone or distance charges. In the Committee's opinion the flat-rate basis of charge is the only satisfactory tariff for British conditions and habits. It has given very careful thought to the obvious suggestion that the present rates should be varied to aid in meeting the large deficit, but it does not agree that a return to the 6d. telegram would increase the volume of business to such an extent that there would be a net increase in revenue.

The only alternative, therefore, to the continuance of the present tariff is an increase in tariff on a flat-rate basis, but it is impossible to forecast with confidence what effect an increase in tariff would have on the traffic. If, with the knowledge and experience which his advisers possess, the Postmaster-General feels that an increase in tariff is worth while, the Committee suggests that the new charge should take the following form: A fixed charge of 1s. 1d., plus ½d. per word, with a rebate of 3d. on each telegram handed in between the hours of 2 p.m. and 9 a.m. Telegrams between Great Britain and the Irish Free State are at present charged at the inland tariff; there are about 1,634,000 such messages a year, producing a revenue of £54,500 against an expenditure of £97,000. From a commercial standpoint there is no reason why these messages should not be charged at foreign rates. The estimated loss on Press telegrams during 1926-27 was £212,000, the revenue (actual) being £83,000. Press traffic has shown a marked decline of recent years, mainly due to the fact that the Press finds a private-wire system better suited to its requirements than the public system. The number of Press telegrams handled by the Post Office fell from 4,194,000 in 1913-14 to 2,020,000 in 1922-23, and now amounts to about 1,045,000 a year. The Committee sees no justification for the continuance of the special tariff; it does not recommend the complete abolition of the copy rate, but considers that it should only be applicable to addresses in the same town. The increased charge would probably result in some reduction of traffic, but the reduction would not be substantial. The rates for leasing to the Press special wires should be substantially increased, and the Committee also recommends an increase of one-third in the ordinary rate for Press telegrams.

It should be made easier for the public to send telegrams, and prominence should be given to the various facilities, some of which are little known. Many of the minor irritations of the present service should be swept away. Insistence on the public themselves affixing stamps to telegram forms is out of harmony with modern conditions. Accounting charges for deposit accounts should cease; the surtax on telegrams sent on Sundays, Good Friday, and Christmas Day should be abolished. The field for the telegram should be widened by the institution at a cheap rate of standard forms of message; examples are seasonal greetings congratulatory telegrams, travellers' messages for railway journeys, and the like. The private wire business should be actively pushed. Much benefit would accrue if better publicity were adopted, and imperial and foreign methods should be studied.

The possibility of the complete fusion of the telegraph, cable, wireless and telephone services might with advantage be explored. This would naturally lead to the heads of the Departments having particular qualifications for their posts, and to these higher posts being regarded as of a more permanent nature, carrying with them remuneration more commensurate with the responsibilities.

In large business undertakings two main incentives operate to obtain satisfactory results: (i) a bonus, or other compensation, for increased effort and (ii) dismissal at any moment in case of inefficiency. In the Post Office under Civil Service conditions neither of these incentives exists, and the present management has no control over the conditions under which it is bound to operate. The Committee recognises that such a method of dealing with the Civil Service may be regarded as entirely impracticable, but it is its considered opinion that this factor is the root fault of the service.

Personal Salesmanship.

The Sixth E.D.A. Conference.

BRIG.-GEN. F. LEGGE (director of the Electricity Distribution of North Wales, Ltd.) took the chair on March 24th at the last E.D.A. conference of this session, when Mr. R. Brymer (Siemens Electric Lamps and Supplies, Ltd.) gave an address on "Personal Salesmanship."

The speaker said that industry stood mainly upon two pillars—production and salesmanship. The success of a salesman depended partly upon the quality and price of the product which he handled and, on the other hand, success for the producer, be his goods ever so marketable, rested with the salesman. Mr. Brymer proceeded to discuss the failure of so many salesmen, stating that the explanation of the success of some and the failure of others was personality. There were many instances in which a salesman, by persistent calling, was able to get at the man he wanted to see and to show his goods, but yet failed to secure business. Something more than persistency was needed to get to know the man to whom it was desired to sell the goods. In a word, to succeed, a salesman must know his man and know himself. Mutual knowledge led to mutual understanding. Having secured that, the way was easy. To succeed, a salesman should go all out to make friends, not by flattery, patronage, or by entertaining, but by the habitual use of all that was best within him. The most obstinate buyer could not for ever remain uninfluenced by sterling character. An outstanding factor in successful personal salesmanship was importunity. A salesman could get nowhere without it. He must always be prepared to call, and call, and call again upon any man from whom he hoped to obtain business. The interviews should be timed judiciously, conducted discreetly and courteously, and the salesman should keep his manœuvring under control. An educated and informing instinct should dictate the moment when it was advisable to depart. Orders were seldom obtained by some types of salesman because of the negative methods adopted—a suggestion in the first place that the man approached did not want anything. The counterpart in the showroom of this failure on the road was the salesman who was not quick and keen to produce a substitute for any article asked for if, at the moment, he had not that article in stock. To the salesman stationed in the showroom, patience was very necessary. So many people entered wanting something, yet not knowing quite what. The elements indispensable to successful salesmanship, therefore, were personality, adaptability, importunity, perseverance, persuasiveness and patience, whilst there should always be added controlled versatility. The last quality was only acquired by wide reading, deep thinking and observation, and the cultivation of the ability to express oneself Further, a salesman should be schooled in the art of reflection, and thereby reap the finest of all education—the education of experience. Mr. Brymer claimed that successful salesmen and saleswomen were indispensable to the welfare of the Empire, and anyone worth his "salt" need never fear unemployment, for there were never enough good ones to go round.

Opening the ensuing discussion, Mr. FRANCIS said that the lecturer had suggested that personality could not be acquired. He believed that the electrical industry would require many

more salesmen than those who were naturally born salesmen. For the people who had not got that quality some conscious development was necessary, and the line on which it could proceed was to try and cultivate those faculties in each other which were common to them.

Mr. Howell contended that salesmanship could not be taught. There was undoubtedly a large amount of latent salesmanship in the offices, stores and factories, and it was up to the man in charge to bring it out. A salesman should endeavour to find out something about his prospective buyer before calling upon him.

Mr. G. Nobbs pointed out that nothing had been said by the lecturer as to the voice production of the salesman, and that counted for a lot with some buyers.

Mr. Hayes suggested that the people who made the best salesmen were those who had been through the stores and the offices.

Mr. Hughes said that another matter of importance was the quality or the value of the material the salesman was trying to sell. Could a good salesman sell an inferior article? Alternatively, could an indifferent salesman without difficulty sell something which was really good? Further than that, in many cases the buyer had to be educated as to his own needs, and that would assume that the salesman must have technical knowledge of the goods which he was selling.

Miss Bryce remarked that the best method of selling was to be able to converse with the prospective buyer on some topic in which he or she was interested.

Mr. V. W. Dale said he was not a salesman himself, but he did not think the speciality salesman needed very considerable technical knowledge. The salesman should study the art of suggestion, and be careful not to dominate his customer too much. He had been told by an Australian buyer in this country that representatives of British firms in Australia were too prone to talk of Empire trade, instead of dealing with their own particular articles.

Mr. Brown asked if it were not possible to grade salesmen. There were some salesmen who would get a first order easily, but would never get another, whilst other salesmen who might be slow in getting the first order never lost their customers once they had obtained them. Or salesmen might be graded according to buyers.

Mr. Faulkner remarked that the salesman must make certain of keeping his customer because a satisfied customer was a good advertisement.

Mr. Brymer, replying to the discussion, said the acquisition of personality was not the same as the natural gift. There were many men who were unaware of the latent ability in them, and it might well be that men who were somewhat lacking in personality might, by self-examination, track the germ of it within themselves. A little technical knowledge was useless when dealing with experts, and it was perhaps as well to be without it. He thought that there was something in the suggestion of grading.

Legal.

Western Electric Co. (Australia) v. Norddeutsche-Lloyd Co.

The reserved judgment of the Second Division of the Anglo-German Mixed Arbitral Tribunal in the above action was delivered on March 21st. As was reported in our issue of February 17th (p. 311), the Western Electric Co. (Australia) (now Standard Telephones and Cables (Australia), Ltd.) claimed the sum of £1,693, plus interest and less an amount of £661 already admitted in respect of the detention and sale during the war of 27 cases of telephone material in course of shipment to Australia when the war broke out.

The Court held that under Article 299 (a) of the Versailles Treaty the contract between the parties was dissolved upon the outbreak of war between their countries. It therefore had no jurisdiction to award the claimants any relief such as was asked for, and the respondents would be allowed £30 costs.

Prosecution under the Merchandise Marks Act.

At Newcastle-on-Tyne Police Court, on March 21st, Jacob Wendorff & Sons, Newcastle, were fined £5 under the Merchandise Marks Act for having sold flash-lamp batteries bearing a false trade description. It was stated that defendants, in dealing with customers, changed the wrappers of the batteries, thereby hiding the fact that they were made in a foreign country. The defence urged that it was the usual practice in the trade.

Assisted Wiring at Hull.

At a recent meeting of the Hull Electricity Committee, the electrical engineer (Major Bell) recommended that work under the Committee's assisted wiring scheme should be given only to registered electrical contractors. The Committee decided to recommend, however, that the work should be done by a member of any electrical organisation, with at least five years' experience. The price per point was left for arrangement between the engineer and the contractor.

Reviews.

Electric Elevators: Their Design, Construction, Operation and Maintenance. By F. A. Annett, M.Am.I.E.E. Pp. 447; figs. 351. London: The McGraw-Hill Book Co., Inc. Price 25s. net.

It is generally agreed that our American cousins have developed to a far greater degree than we have the science and practice of electric lifts—or, to give them their American name, electric elevators. Perhaps this is, to a certain extent, what might have been expected in view of the far higher buildings which are to be found in many of the larger cities of the United States, but this should have affected only the development of passenger lifts, whereas for the raising and lowering of merchandise the lift, or "freight elevator," as it is called on the other side of the Atlantic, is far more extensively employed in America than it is in these islands. This may be explained by the fact that labour costs are far higher in the United States than they are here, but in view of the necessity for reducing costs both of manufacture and of transport by every possible means, there is no doubt that the electric lift for the handling of goods could be far more extensively employed in this country than is actually the case. This book is entirely American, since not only is it written by an American engineer, but the various types of lifts which he describes and illustrates have all been produced by American manufacturers for use in American buildings; nevertheless, we feel that a study of its contents should prove of very great value to electrical engineers in this country who may in any way be interested in the design, construction, and maintenance of lifts.

The necessity for studying the methods adopted in the United States is further emphasised by the assertion made by the author that within the last 10 years the design of elevators has been "practically revolutionised," improvements being incorporated not only in the method of controlling the movement of the car but also in the method of driving it, until to-day in passenger elevators speeds of 800 ft. per min. are quite usual and speeds as high as 1,100 ft. per min. have been adopted in certain experimental installations. These high speeds—which are far in excess of any employed in these islands—do not cause any feeling of inconvenience to the passengers, since the acceleration is kept low. Obviously, therefore, they can only be adopted where high lifts, as in sky-scraper buildings, are met with. The reviewer has been in the express lifts in some of the most up-to-date sky-scrapers in New York, and can testify that there is no feeling that the speed of ascent or descent is excessive.

Perhaps one of the greatest difficulties which have been experienced in the design of lift equipment is to render it suitable for use with alternating current. So far no system has been devised which is entirely suitable for high-speed lifts, although low-speed systems suitable for freight handling are available, using a.c. motors and a.c. control gear. Normally, however, the system employed where only alternating current is available, is first to convert the a.c. to d.c. by means of a motor generator. Hence, by far the larger portion of the book is devoted to direct current systems and the methods of control to be employed with direct current. In this connection a number of wiring diagrams are given showing all the connections, not only between the motors and the controllers, but also to the various safety devices. And in spite of the fact that no fewer than ten of the twenty-five chapters which the book contains are devoted to systems of control, the author is compelled to admit that this part of the treatment of his subject is not complete in view of the many systems which are available. We cannot refrain from expressing the opinion that it would be of great advantage not only from the point of view of the manufacturer, but also from that of the user, if some degree of standardisation could be adopted with a view to reducing the number of systems which are employed. The various chapters on the mechanical equipment, such as methods of roping, bearings, overspeed governors and brakes, are very well done and merit careful study. The drawings throughout are well selected and clearly reproduced, and add materially to the value of the book. Perhaps if we might offer a word of criticism, it would be to suggest that the subject of "freight elevators" should be given rather more detailed treatment, as these, in many respects, can be vastly simpler than passenger lifts, since no control gear on the car itself is required. This type, moreover, has a very great field of application which at present, particularly in this country, has hardly been touched.

The Cable and Wireless Communications of the World. By F. J. Brown, C.B., C.b.E., M.A., B.Sc.(Lond.). Pp. ix+148; figs. 21. London: Sir Isaac Pitman & Sons, Ltd. Price 7s. 6d. net.

Mr. Brown's qualifications for writing this book are unique and what he has to say must necessarily carry weight. It is a book which may rightly be called important, both as a book of reference and as an expression of well-informed opinion on a matter which is exercising the minds of all those interested in the broad problem of communication. The author has been identified for many years with the administration of the cable communications of the Empire from the Government point of view, and more recently with the wireless communications as well. He retired from Govern-

ment service three years ago, and now holds the post of Director of the International Cable Companies' Association. The book is primarily a survey of present-day means of international communication by cable and wireless, but it makes some interesting, though guarded, excursions into the future. It deals with the history of the cable and wireless communications of the world, the manufacture and maintenance of cables including the latest types, the developments of wireless including the beam and facsimile transmission, the general control and working of cable and wireless systems, the broader aspects of broadcasting, and, what is of such outstanding interest just now, the financial aspects of cable and wireless communication.

It is a wide field to cover in less than 150 pages, but it is accomplished in a masterly manner which cannot fail to appeal to all those who are financially interested in the developments of cables or wireless, and, indeed, to all who take an intelligent interest in the development of the communications of the world. No one can read the book without being deeply impressed with the strong financial position of the cable companies in this country and the striking technical improvements that have been made in the last few years. One is made to realise clearly that until the advent of short-wave wireless there was really no sign at all of serious competition with cables for long-range telegraph working. For telephony, of course, it was different, the cables have not yet come into the picture, whereas wireless telephony on long waves over great distances is an accomplished fact.

But it is on what may be called cable finance that this book is especially valuable, and there is no other publication, so far as we are aware, which explains in so clear and convincing a manner the conditions which govern economic rates for the various types of traffic.

Mr. Brown points out fairly how the advent of short-wave wireless has changed the whole outlook, and he suggests, what we hope will result from the present negotiations, "a mutual arrangement satisfactory to the competitors and not inimical to the interests of the public." We should have liked more of Mr. Brown's views of the future of wireless, but we could hardly expect much, considering his present appointment, and we get little, and that little distinctly conservative. What he has done is to give us a clear bird's eye view of the position at the moment, with an emphasis on the strong points of cable working. He seems to feel freer in his short chapter on broadcasting, in which a new line of interest is advanced the international aspect. He puts forward a strong plea for the development of commercial broadcasting which he predicts will serve as the handmaiden of peace.

We noticed the following misprints: deprecations for depredations on p. 30, addresses for addressees on p. 54, advantage for disadvantage on p. 83.

Electric Control Gear and Industrial Electrification. By W. WILSON, M.Sc., M.I.E.E., A.A.I.E.E. London: Oxford University Press (Humphrey Milford). Pp. xii+361; figs. 216. Price 25s. net.

It has been said that electricity is a good servant but a bad master, and since there would seem to be much truth in this statement it is clear that the subject of the volume under notice is of first-rate importance. Mr. Wilson is well known as having had much experience in connection with control gear and he has succeeded in incorporating a very large amount of theoretical and practical information on the subject in his book.

An endeavour has been made to make the book as self-contained as possible, and early chapters are devoted to simple accounts of the modes of operation and characteristics of direct and alternating current machines. Coming to control gear proper, manually operated starters and controllers for direct and alternating current motors are first considered. In connection with starters of this type for induction motors, little attention seems to be paid to the relative values of the torque per ampere of line current at starting for the several methods of starting available for this class of machine. It is an important aspect of the subject and leads to interesting results in connection with the use of resistance in the stator circuit of a squirrel cage motor in comparison with other methods which are available for the reduction of the pressure applied to the stator.

Resistors of the metallic and liquid types are next considered, and here we notice that the well-known Preece law is advocated for use in calculating carrying capacities for wires of different diameters (it is also used later in the book in connection with fusing currents). Of course this law, in which the current is taken as varying with the diameter raised to the power of 1.5, is the theoretical law and is perhaps accurate enough when working over a small range of sizes. Practical tests indicate that the facts, in connection with fuses at any rate, are better represented by indices other than 1.5, and the difference between the two methods may be important if the calculations are made over a wide range of diameters. Very interesting chapters follow, giving accounts of contactors and their adjuncts for automatic operation and the analysis of the relative behaviour of coils excited with direct and alternating current is very interesting and well done.

The concluding chapters of the book deal with the application of the appliances and principles already described and enumerated to a great variety of commercial purposes ranging from rolling mills and electric winding gears to organ blowing. This part of the book is of a very practical character and furnishes a large amount of information of direct use to those engaged in the installation of control gear, since, not only is information given concerning the gear itself, but many valuable data are included concerning the conditions and difficulties which are encountered in planning and executing the installation. An appendix gives information concerning the power required for many common industrial operations.

The book is fully illustrated and many of the specially drawn diagrams of simplified schemes of connections cannot be too highly praised. There are also many half-tone figures and, while many of these are of interest, some convey little information and could usefully be replaced by line diagrams of connections.

The book can be heartily commended and is likely to appeal to many types of readers. Prospective users of control gear and consulting engineers will find that information is given concerning possibilities and capabilities of control systems which is, in most cases, non-mathematical; manufacturers and designers will find many valuable data; and students of the subject will find the underlying principles clearly discussed.

Overhead Systems Reference Book. By a SPECIAL COMMITTEE OF THE NATIONAL ELECTRIC LIGHT ASSOCIATION. Pp. 592; figs. 688; tables 127. New York City, U.S.A. price $7.50.

This book is divided into twelve sections, consisting of engineering and other information on wood poles and their preservative treatment, concrete poles, steel poles, towers and sub-station structures, properties of materials, insulators, transformers and regulators, protective apparatus, street lighting, electrical calculations, mechanical calculations, methods of construction for low- and medium-voltage lines, meteorological data, tree trimming, and general safety suggestions, also suggested specifications for overhead construction materials.

The book is distinctly American, and its contents are exclusively devoted to American practice and standards.

The purpose of this book is to present in one volume a description of the apparatus, material, methods, and principles involved in overhead line construction and the tabulation of necessary formulæ, &c., for the electrical and mechanical solution of various transmission and distribution problems. Although this book was prepared by a special committee of the Overhead Systems Committee of the National Engineering Section of the National Electric Light Association, it is not a book of rules and regulations nor an attempt to create standards or specifications to govern the construction of overhead lines. The formulæ and data have been taken from various sources. The specified loadings, &c., given in the text are based on the National Electrical Safety Code (4th Edition), and the tabulated and other matter is based on American sizes and standards.

The "heavy" and the "medium" loadings are practically equivalent to the two specified conductor loadings for this country, with the exception that, for wind pressure, they still maintain the constant $\kappa = 0.0025$. Hence, for this country, where designs are based on wind velocities, the wind pressure in lb./sq. ft. is greater, and the corresponding loadings are greater, for conductors and conductor-supports for an equal wind velocity in miles per hour. There is a decided advantage for "medium" loading in America as compared with the same loading here in that it is applicable for all voltages, &c., even though the climatic conditions are worse there, *i.e.*, the "loading district" is, if anything, more severe as regards climatic conditions.

The book is well illustrated, contains a comprehensive index and is bound in flexible leather with gilt edges, and has round corners.

Electrical Supply Regulations, 1927. Electrical Wiring Regulations, 1927. Dominion of New Zealand. Pp. 123; 16 tables. Wellington, New Zealand. Price 2s. 9d. (Postage 3d.)

The Dominion of New Zealand is to be complimented on the excellent production of the Electrical Supply Regulations and the Electrical Wiring Regulations, 1927, and it is to be hoped that the standards of practice in New Zealand will serve as object lessons in the drawing-up of safety standards of construction for this country.

Of importance at the moment is the system of distribution. This country is about to make a start on the "main transmission lines" or so-called "grid"; the distribution of electricity from the transforming centres of supply will therefore be limited to the use of one or two most economical methods, and this part of the whole is by far the most important. It is vital that a start be made with the best, the safest, and the most economical system of distribution and line construction, *i.e.*, a system of construction capable of starting out with the least expenditure and the least possible number of conductors and wires and offering the best protection; a system that can be completed at any time as requirements of load, &c., demand with the least expenditure and modification; and a system that can be extended in all directions and to any length to meet any practical requirement for combined lighting, heat, and power service—in other words, a system and construction

best applicable not only for the present but for all time, and a system and construction best capable of meeting the needs of this country. Such a practice is the wood-pole construction, and such a system is the three-phase, four-wire.

Line construction for the distribution of electricity in general is as important as the system itself. If the safest and cheapest method is desired then we must start out with wooden construction. For practically all distribution lines this type of construction, with wood cross-arms, fulfils practically all the requirements for the most perfect line. The wood pole possesses the most ideal outline to resist stresses; it permits of the highest flash-over value for equal insulator rating; it has equal strength in all horizontal directions; it possesses a flexibility such that it permits of relatively less loading, *i.e.*, less snow or sleet accumulation on conductors and wires than any other type of construction acceptable in this country, due to relatively more numerous and greater movements caused by winds in particular; it has valuable insulating properties; it permits of the safest and best operated line; and, it permits of the most economical construction and the most desirable line for rural areas, &c.

Although it may not be accepted that the climatic conditions in New Zealand are comparable with those of this country, some reward can be reaped by studying the figures and practices, such as, for instance, the minimum permissible overhead conductor clearances, number of earth connections, maximum permissible resistance to earth, &c., and the Post Office (Minister of Telegraphs) requirements in particular.

As in all other countries where a close study of loading conditions has been made, these Regulations specify a loading of wind and/or ice independent of line voltage, which is logical reasoning. Also they fix limits to the length of span (for a lower specified loading) independent of line voltage but dependent on location and locality. That is to say, the Regulations specify ½ in. ice loading where it is known to occur, and the greater wind loading where it more generally occurs, *i.e.*, greater wind pressure where lines are erected outside township limits than where lines are located within township limits; and whilst within township limits the specified wind loading is less, on the other hand the span length is limited to a maximum of 165 feet. All these practices, based on careful thought, should be of value to the Electricity Commissioners when preparing the new Regulations for this country.

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Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and aoridged and all subsequent proceedings taken.

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30,194. "Switches for electric torches for use with small arms." Lyon and Lyon, Ltd. October 22nd, 1926. (279,371.)
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30,272. "Jointing of electric cables and apparatus therefor." Callender's Cable & Construction Co., Ltd., and J. F. Watson. November 30th, 1926. (286,348.)
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28,344. "Dust-suction apparatus for cleaning by vacuum and driven electrically." G. R. Limm, G. R. Schott, and G. Curutchet. October 28th, 1926. (279,858.)
28,618. "Ultra-audible transmitting and receiving apparatus." P. Langevin. January 27th, 1926. (Divided application on 265,181.) (279,878.)
29,244. "Manufacture of closed vessels such as electric lamps." General Electric Co., Ltd. November 12th, 1926. (280,531.)
29,634. "Tensioning devices of machines for winding coils of wire and the like." British Thomson-Houston Co., Ltd. November 20th, 1926. (280,896.)
29,585. "Telephone head piece receivers" General Acoustics, Ltd. (Dictograph Products Corporation). November 4th, 1927. (286,185.)
30,639. "Thermionic valve circuit systems." Igranic Electric Co., Ltd., and H. Hopwood. November 15th, 1927. (286,578.)
30,826. "Sound reproducers." De Forest Phonofilms, Ltd. December 1st, 1926. (281,634.)
33,890. "Reproduction of recorded sounds." H. J. Kuchenmeister. December 15th, 1925. (Divided application on 263,131.) (282,413.)
34,494. "Combined loud-speakers and time-pieces for use with wireless receiving devices and the like." G. W. Melland and P. Gray. December 20th, 1927. (286,193.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from March 21st. In the case of foreign applications, the names and addresses of the British representatives are also given :—

Design only. No. 479,783. Class 6. Machinery of all kinds. No. 479,784. Class 8. Physical and electro-technical instruments, &c.—Siemens & Halske Gesellschaft, Berlin. (Haseltine, Lake & Co., 28, Southampton Buildings, Chancery Lane, W.C.2.)

Ethatrope. No. 487,433. Class 8. Philosophical and scientific instruments and radio-telephonic apparatus, &c.—M.P.A., Ltd., 62, Conduit Street, W.1.

Mep. No. 485,394. Class 13. Electric headlamps for use on motor vehicles, motor cycles, bicycles and locomotives.—M. E. Power, 41, Queensborough Terrace, Hyde Park, W.2.

Superla. No. 486,634. Class 50. Electrical insulating material of mineral wax.—Standard Oil Co., Whiting Ind., U.S.A. (Boult, Wade & Tennant, 112, Hatton Garden, E.C.1.)

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

BEDFORD.—Reinstatement (after fire) of Southill House (mansion), for S. Howard Whitbread, L.L., of Beds.

BIRMINGHAM.—Wesleyan church, Warley Woods (£9,300); trustees.

BOURNEMOUTH.—Shops, showrooms and flats, Westover Road; S. B. Parsons. Club and billiard saloon, Brassey Road; T. J. Rowley. Alterations, Rainbow Dye Works, Stourvale Road; Rainbow Dye Works, Ltd.

BRADFORD.—Block of shops and offices (five floors), Manningham Lane; T. L. Dixon, architect, Stanwix House, Buttershaw.

BROMLEY (Kent).—Congregational church (£7,950), West Wickham; E. Ford Duncanson, architect.

BROOKWOOD (Woking).—Extensions, with electric light and heating, Mental Hospital (£65,000), for Surrey C.C.; clerk.

BROUGHTON.—School for Lindsey E.C.; Scorer, Gamble and Co., architects, Bank Street Chambers, Lincoln.

BURY ST. EDMUNDS.—Church schools with electric lighting and central heating; J. Birmingham, architect.

CATHERINGTON.—Houses (100) for the R.D.C.; district surveyor.

CATTERICK CAMP (Yorks.).—Presbyterian church; War Office.

COCKETT.—Joint asylum for Swansea and Merthyr Corporations; Swansea borough architect.

COLCHESTER.—Oil refining works, The Hythe, for the Medway Oil Co.

CREWE.—Additional housing scheme (74), for the T.C.; borough surveyor.

DERBY.—Housing scheme (160), for the T.C.; C. A. Clews, borough surveyor (returnable deposit of £1 1s.).

DONCASTER.—Infectious diseases hospital and sanatorium, Tickhill Road; Adshead, Topham & Adshead, architects, 14, St. Ann's Square (£2 2s. deposit to W. Bagshaw, town clerk).

EASTLEIGH (Hants.).—Electric light installation, Wesleyan trustees; Rev. T. E. Deakin.

FENTON.—Workmen's hostel; Stoke Corporation Special Committee.

GLASGOW.—Conversion of buildings into hotel; manager, Douglas Hotel.

GRAYS.—Additional housing scheme (50), for the U.D.C.; surveyor.

HARROW.—Houses (101), Eastcote Lane site, for the U.D.C.; James & Woodruff, builders.

ILFRACOMBE.—Reinstatement after fire of Imperial Hotel, for Leonard Parsons.

JOHNSTONE.—Hospital improvements, including lighting and heating (£3,000); medical officer of the hospital.

LEICESTER.—139 houses, Braunstone Estate; Bodill & Sons, Ltd., Hucknall, near Nottingham. Re-erection of boot factory, for Pole & Whitmore, Ltd., 23, Checkett's Road, Belgrave (£15,000).

LIVERPOOL.—Fire station and dwellings, Rose Hill, Mossley Hill (£53,000); land steward and surveyor, Municipal Buildings.

LONDON (Millwall, E.).—64 flats, River Street; R. A. Reader.

(Hornsey, N.).—Additions, Manor Works, High Street; Brasse, Ltd.

(Southgate, N.).—Wesleyan church (£10,000); trustees.

(Camden Town, N.W.).—Electricity supply, Parish Room, Clarendon Square; St. Mary's trustees.

(Bermondsey, S.E.).—Offices for Spillers Victoria Foods, Ltd., Jacob Street; W. Figg.

(Barnes, S.W.).—All-electric houses (90), Denehurst Road, for Mr. Sturgis, builder. Houses (36), Denehurst Gardens, for C. S. Banks.

(Clapham, S.W.).—Block of flats, King's Avenue; R. Mansell. Alterations, Two Brewers, High Street; L. and W. Whitehead, Ltd.

(Westminster (S.W.).—500 dwellings and re-development, Grosvenor Estate, Millbank; City Council and Duke of Westminster. Premises, Grosvenor Gardens; Yates, Cook & Darbyshire. Extensions, King's College, Strand, W.C.2; F. W. Troup, architect. Buildings, Tufton Street and Marsham Street; Browett, Taylor, Robertson and Morgan, Lincoln's Inn Fields.

LONDON—*continued.*

(Hendon, N.W.).—Presbyterian church; secretary, North London Presbyterian Church extensions; committee.

(Fulham, S.W.).—Buildings, Hammersmith Road; J. Lyons and Co., Ltd. Buildings, 48-62, Peterborough Road; W. J. Marston & Son.

(Kensington, S.W.).—Conversion of Holland Park Rink into Austin motor-car depôt; Cooke, Davis & Goldsmith.

LONGTON (Staffs.).—Electric lighting, Employment Exchange, Locketts Lane; Office of Works.

LOWESTOFT.—Alterations, Theatre, London Road; F. C. Symonds.

MELKSHAM.—Mineral water factory, Broughton Road, for Mr. A. W. Hunt. Business premises for G. Rogers and Co., Trowbridge.

MYTHOLMROYD (Yorks.). — Re-instatement after fire (£1,000); Abraham, Robertshaw & Sons, Ltd., cotton waste spinners, Westfield Mill, Mytholmroyd.

NESTON AND PARKGATE.—Additional housing scheme (40), for the U.D.C.; surveyor.

NEWARK-ON-TRENT.—Houses (50), Gilstrap Park, for G. Hotter & Son, Ltd., Billingborough.

NEWCASTLE.—Housing scheme, 71 acres at Fenham; city engineer.

NORTHAMPTON.—Additional 68 houses, Kingsthorpe, for the T.C.; Alfred Fidler, borough engineer.

NOTTINGHAM.—38 houses, Havensworth Road; C. T. Howitt, 38, Long Row. Cinema, High Street, Hucknall; A. J. Thraves, architect, 12, Victoria Street.

ORSETT (Essex).—Extensions to Institution, for the B.G.; E. Fincham, architect.

PAIGNTON.—Extensions, Tram Depôt, Torquay Road; Torquay Tramway Co. 27 houses, York Road; C. W. Colborne, architect.

PENRITH.—Re-erection of agricultural engineering works, electrically equipped, for G. & J. Thompson (£50 000).

PENZANCE.—Shop, salerooms, workshops and stores, Carcase Market site; Simpson Bros., Ltd., tailors and outfitters. Housing scheme (116), for the T.C.; borough surveyor.

PERTH.—New entertainment pavilion on South Inch; A. K. Beaton, architect.

REDCAR.—Baptist church; trustees.

RIPON.—38 houses, Aismunderby Estate; city engineer.

ST. AUSTELL.—Hotel with 100 bedrooms; Crinnis, for the Great Western Railway Co.

ST. IVES (Cornwall).—Improvements to Tregenna Castle Hotel, for the Great Western Railway Co.

SALISBURY.—Extensions, Harnwood Hospital, for Wilts C.C.; T. Walker, county architect, Trowbridge (returnable deposit of £2 2s.).

SHIPLEY.—Warehouse, Dock Lane; Dock Mill Scouring Co.

SKIPTON.—Electric lighting at Poor Law Institution; Jas. Hartley, architect; M. R. Knowles, clerk to Guardians.

SMETHWICK.—Wesleyan church (£6,000), with electrical and heating work; Webb & Gray, architects, Dudley; John Guest & Sons' Successors, builders, Amblecote.

SOUTHAMPTON. — Extension of Children's Hospital (£30,000); Col. Gutteridge, hon. architect.

SOUTH SHIELDS.—Ice-cream factory and café, Mile End Road; Howard Hill. Warehouse extension for Walter Hansen & Son, Nile Street; William Duncan, Ltd. 30 houses, near Stanton Avenue, for Messrs. J. T. Armstrong & Son; H. Hill.

STAFFORD.—Housing scheme (36), Stone Road Estate, for the T.C.; W. Plant, borough engineer.

STOKE-ON-TRENT.—40 houses, Basford Hall Estate; F. V. Hulme, architect. Sewage purification works (£80,000); Henry Hays (Manchester), Ltd.

STRATFORD-ON-AVON.—Additional 40 houses, for the T.C.; borough surveyor.

SWANSEA.—50 houses, Mayhill Estate; Samuel & Evans. 500 houses, Mayhill and Townhill Estates; borough architect.

TAUNTON.—Printing works and offices, Bridge Street, for the *Somerset County Herald*.

TEIGNMOUTH (Devon).—28 houses, Mill Lane site, for the U.D.C.; Council surveyor.

TRENTHAM.—Housing scheme, 40 acres, Newstead Farm; Stoke city engineer.

WHITEFIELD.—Extension of Whitefield Mills, for Mark Fletcher & Sons, Ltd., Whitefield.

WORCESTER.—Smallpox hospital (£9,000); Worcestershire county architect.

WREXHAM.—New St. Margaret's Church (£9,000); W. E. Samuel, builder.